ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXVIII. No. 3289 DECEMBER 6, 1940 SIXPENCE

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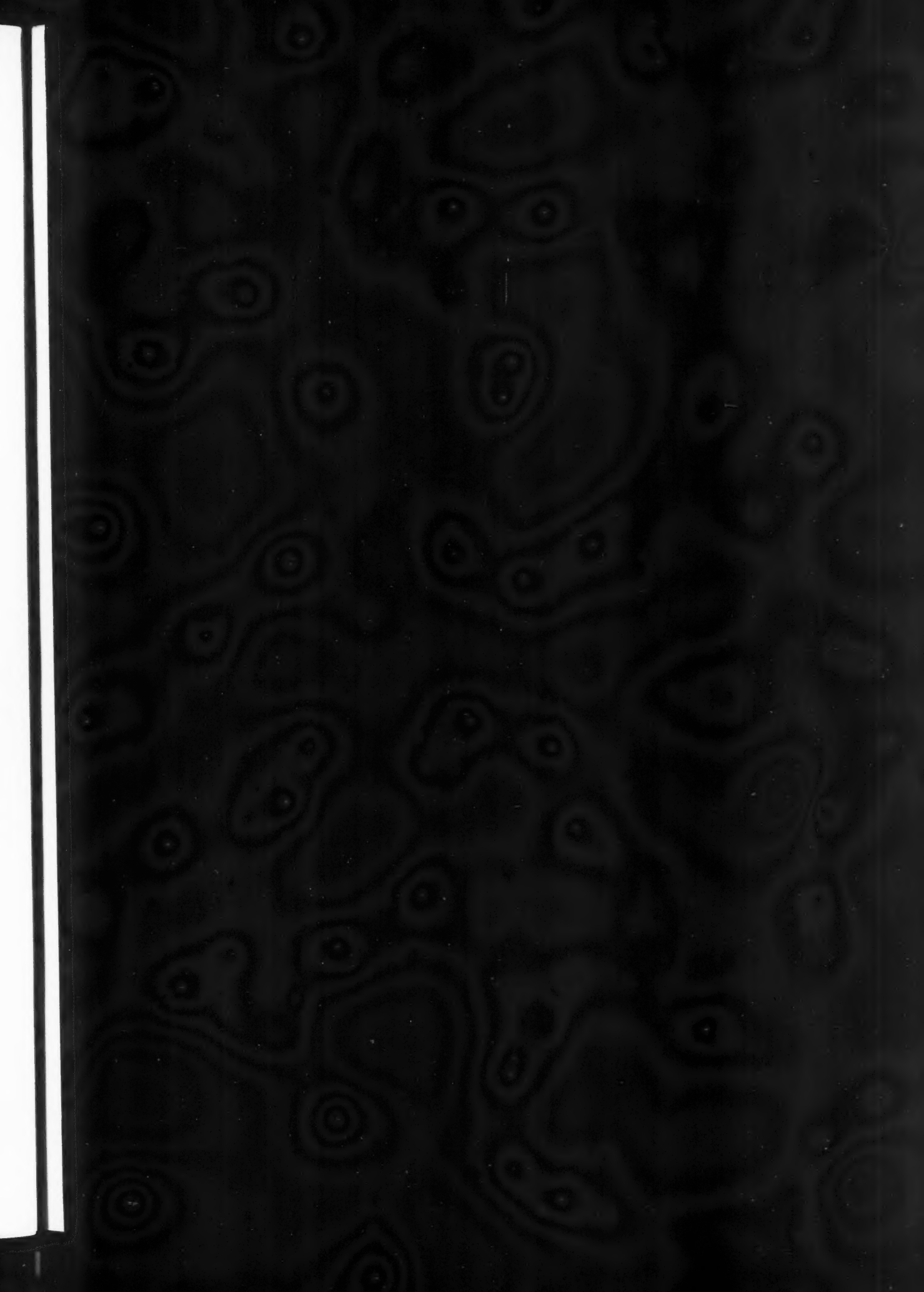

THE ELECTRICAL REVIEW

Volume CXXVIII — No. 3289

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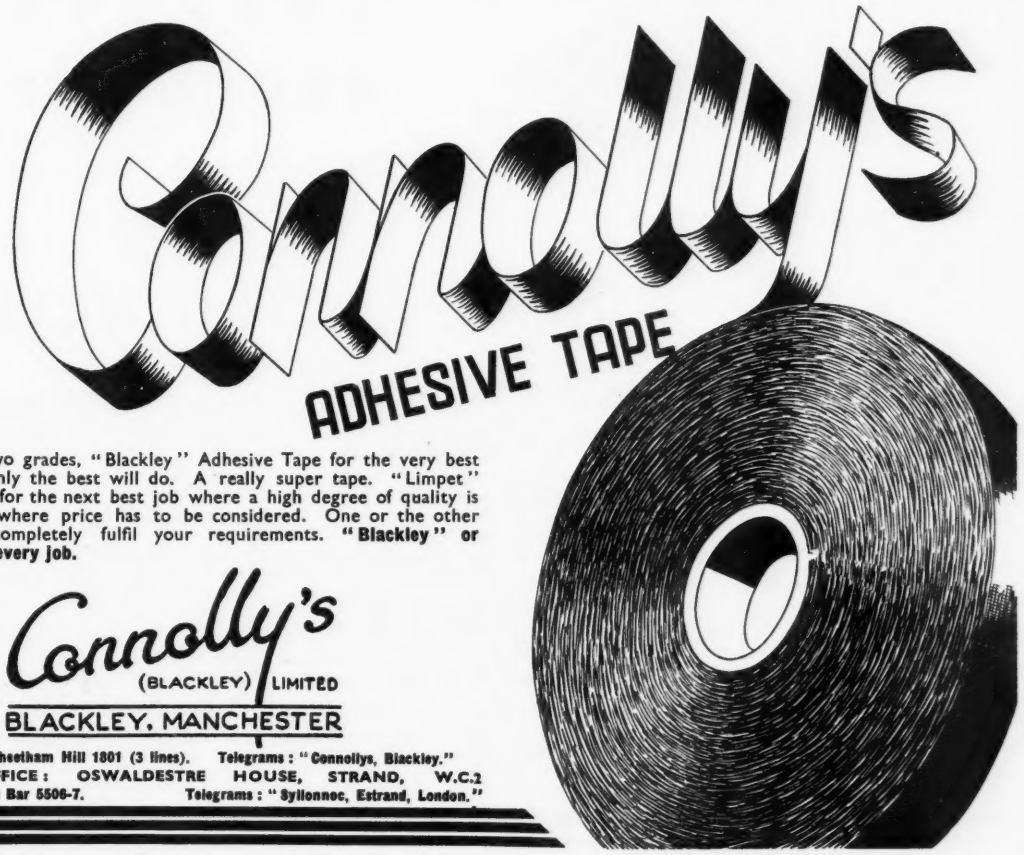

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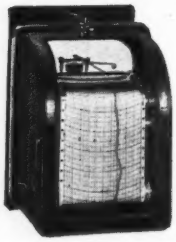

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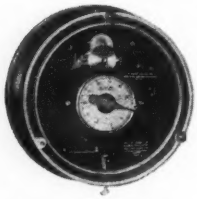

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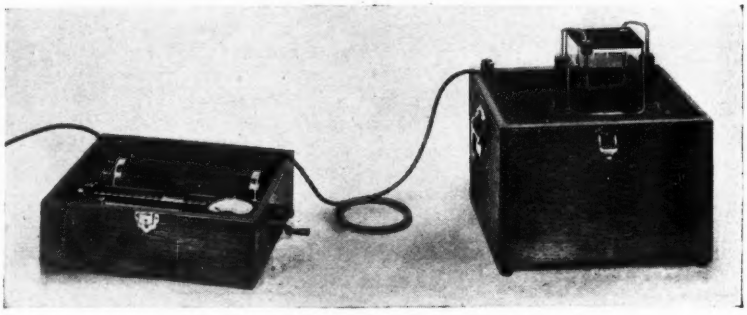

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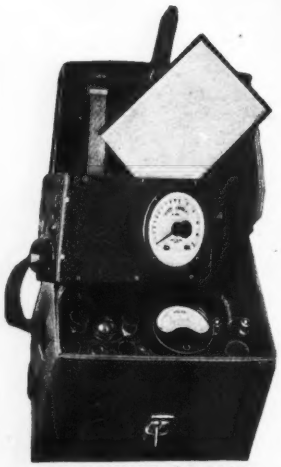

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THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVIII. No. 3289 DECEMBER 6, 1940 Price SIXPENCE

Engineers and Administrators

Cultivating the Broader View

A FEW years ago when " technological unemployment " was much to the fore, scientists and engineers were blamed for it. Later, when the threat of war loomed up, they were held responsible for adding to its horror. These charges evoked sharp retort. Men who had given their lives to constructing the mechanical framework of advancing civilisation did not conceal their contempt for the moral and intellectual bankruptcy of those who had, it seemed to them, so signally failed in their duty to employ the fruits of science as they were intended to be employed—for the benefit of the human race. They regarded such criticism as an expression of " defeatism " in the face of progress and compared its querulousness with the curses of the ungrateful Caliban on his benefactor.

Intelligent Use of Knowledge

They went further and questioned whether the training of statesmen and administrators was such as to enable them to make intelligent use of the knowledge placed at their disposal (of greater importance in the circumstances than the possession of knowledge as such) or even to render them fit to be entrusted with the power that accrued from the work of scientists.

In an address to the Institute of Fuel recently, Mr. W. M. Selvey suggested that an education primarily based on " the humanities," often accompanied by a complacent ignorance of technology, is unlikely to produce men capable of governing a world that becomes more and more technical. He quite reasonably claims that it is not more difficult to distinguish among young technologists than among classical graduates what men are likely to develop into successful administrators.

Mr. Selvey recognises, however, the value of a liberal education to young engineers, who sometimes, we believe, show excessive caution lest broadening the mind should stress it beyond the " limit of elasticity," thus producing mental flabbiness. He commends the study of extraneous subjects that students are too apt to consider of little importance, and in this his views are in accord with those expressed in the I.E.E. presidential address. Mr. Beard, however, is more critical of the shortcomings of engineers themselves as found in their general lack of interest in the uses to which discoveries and inventions are put, with which is so often associated tendencies to disparage non-material cultural subjects and to regard political questions, and all that these imply, as unworthy of serious consideration. Similar views were expressed by Mr. J. Eccles before the Edinburgh Electrical Society recently.

In short, the fault that scientific developments do not work out as intended does lie, to a great extent, at the door of those entitled to claim the credit since they do not fit themselves to relate the part to the whole. This is a pity because, as Mr. Beard observes, many have been led to take up engineering through a natural aptitude for logical thought which, with subsequent training (including, we may add, a knowledge of all sorts and conditions of men which they gain while serving their time) ought to be of immense value to society. A working example of this within the more limited scope of the industry is to be found in the control of manufacturing concerns and supply undertakings by engineers, who have the right mental background against which to appraise the broad merits of any scheme, even though they may have lost touch with some of the minor technical considerations on which it rests.

Foresight and Specialised Training

Nevertheless, to extend the intellectual range of engineers and to choose administrators from those whose minds are more attuned to technical possibilities does not appear to go far enough. It can no longer be taken for granted that one generation will live in much the same conditions as its predecessors with only relatively minor modifications in environment. The impact upon society of technical innovation, rapidly gathering momentum, entails, as Sir Josiah Stamp pointed out to the British Association a few years ago, foresight and specialised training in devising means of smoothing resistance to inevitable major changes.

This calls for a new kind of training to bridge the gap

between and to co-ordinate the work of technicians and of administrators—a training that will enable those who undergo it to make a synthesis of knowledge and also to envisage its tendencies and its ultimate effects. This involves a real knowledge of mankind in corporate relationship, which may differ markedly from the relationship of individuals. To quote Mr. Selvey: "One cannot perpetuate water-tight divisions of thought, action and responsibility and continue modern civilisation."

The Future of Power

ENGINEERS wishing to acquire a bird's-eye view of whither their activities may lead will find a great deal upon which to exercise their imagination in this year's Hawksley Lecture. The deductions to be drawn from the comprehensive data on power resources, existing and potential, that Professor A. C. G. Egerton has got together are most suggestive as to the manner in which the engineer is likely to influence future world problems. The thousand years, which he allows for the complete exhaustion of coal and oil, may seem too far ahead to give much cause for anxiety now, but the pinch will be felt in the more developed industrial countries a very long time before then—indeed, it will make itself evident in the easily foreseeable future. Much is being done to reduce the amount of fuel used per unit of power, but possible further economies with present methods steadily become less, and the worker of the future will require more than the 1 H.P. as an average now allotted to him.

Justifiable Interference

IN our last issue we referred to the possible invocation of the Conditions of Employment Order to compel a recalcitrant supply undertaking to observe the terms of the schedule drawn up by the Joint Industrial Councils for the industry. The November issue of the journal of the Electrical Power Engineers' Association reports that results have been achieved in other cases by reminders of the existence of the Order. Particular reference is made to a Scottish company which has persistently refused to recognise the National Joint Board Schedule in its entirety. Having been reminded of the Order, the company has now agreed to see an official of the Association and hopes are entertained of the company's falling into line. A small local authority in Yorkshire has applied for membership of the No. 2 District Joint Board after its attention had been drawn to the Order, and the Association is referring the case of a small supply company to the Ministry of Labour. It will be pleaded by some that all this is "interference with the liberty of the subject," but the majority will agree that agreements democratically reached should be observed by all in the industry concerned.

Something for Nothing

EXPERIENCE has taught us to examine very closely any offer which does not, on the face of it, bring some benefit to the tenderer. But that is not to say that we are always disappointed: for instance, the offer of lighting advice and service made by the National Industrial Electric Lighting Service to factory owners is undoubtedly a genuine one even if no immediate advantage seems likely to accrue to those who are represented on the new body. They hope, of course, that the factory owners having taken advantage of the free advice will set about putting their lighting in order and employ fittings, cables and lamps made by participating manufacturers and place the work in the hands of members of the E.C.A. or the corresponding Scottish body. The electricity supply section is the only one almost certain to derive benefit. Nevertheless we hope that this good work will meet with its just reward as we believe that of the E.L.M.A. Lighting Service Bureau has done. Actually of course the new Lighting Service is operating a similar system to that of the Bureau except that it is on a wider basis and perhaps goes a little deeper into one particular aspect of lighting—a most important one.

Lighting Suitability

ILLUMINATION cannot be suitable unless it is adequate, and no doubt because in the past there has usually been so woeful a deficiency of ft.-candles in factories, more emphasis has been placed on adequacy than on suitability of lighting. But the advantages of having enough light are now more widely realised, and the time has come for paying greater attention to the best methods of using it, especially in view of the long hours now being worked under artificial light. In recent lectures to local centres of the Illuminating Engineering Society, Mr. R. Maxted goes beyond a consideration of glare in relation to its harmful physical effects. He deals also with the psychological aspects of light sources of relatively extensive area and low brightness and having the diffused near-daylight colour of tubular fluorescent lamps. Another good point he makes is that local lighting should be thought of as the main lighting and that general lighting should be regarded as supplementary. If the matter were generally looked at in this way it would bring to the fore the recommended ft.-candle values for specific purposes, relegating the statutory minima for general lighting to the background, where they should be kept.

Shelter-Wiring Warnings

OUR repeated references to the risks lurking in the improper wiring of air-raid shelters may be considered monotonous; but it is a subject which must be kept in the forefront until those responsible have done their utmost to eliminate the danger. We consider that all supply undertakings should follow the example of the many which have warned their consumers by circular or in the local newspapers, even if they go to the length of an authority whose advertisement has been sent us by Mr. Harry Moss, of Bradford. This is couched in such terms as to make it appear that the consumer must complete a special application form before he is permitted to connect up a shelter installation and the installation must be inspected to ensure that it complies with the "appropriate Wiring Regulations." Of course the authority's standing in the matter is not absolutely certain (apart from the permission to withhold supply to dangerous installations given in Section 27 of the Electricity Supply Regulations) but everybody who has the welfare of the electricity supply industry and its consumers at heart will appreciate any effective action, even if it may possibly be a trifle *ultra vires*. We should mention that the advertisement also advises the employment of competent contractors and the guarding of fire elements.

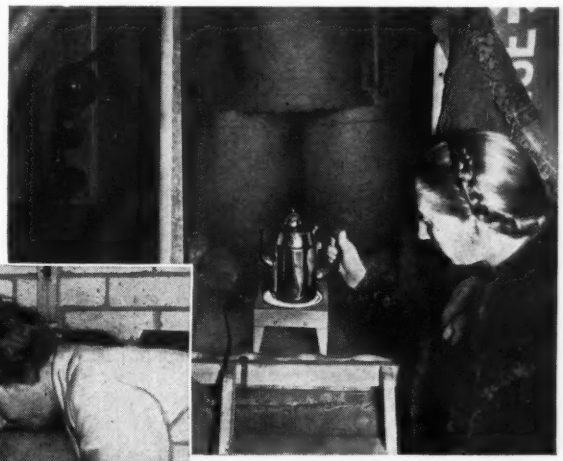
MEETING AIR-RAID CONDITIONS

How Electricity is Proving Its Worth

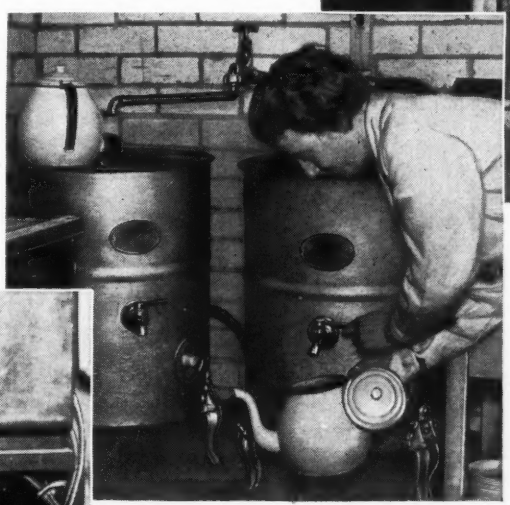
Although intensified air raids have adversely affected supply undertakings, there have been compensating factors and electricity has proved to be indispensable in time of trouble

WHILE the maintenance of supply has of necessity been the principal anxiety of electricity undertakings it has not by any means been their only one, since the war has brought in its train numerous other problems. In the first place there are the effects of the new conditions on load, consumption and, ultimately, on the financial stability of the undertakings. In considering this there are several factors to be borne in mind. On the debit side there are first of all the losses occasioned by the cessation of supplies to uninhabitable properties. The extent of these losses varies, of course, from district to district, and added to these "total losses" is the temporary discontinuance of supplies. Moreover, this does not take into account the considerable number of voluntary evacuations which have inevitably increased since the intensification of the bombing began.

Next there is the fact that from dusk onwards a very large proportion of the population spends the evening in shelters. Whether these are public or private there is a marked decrease in the amount of electricity required for lighting. A public shelter may or may not have electric lighting and in any case it is usually far from brilliant, while a 25- or 40-W lamp is probably considered quite sufficient for a shelter for a private house where in a living-room a 100-W lamp would normally be continuously in operation, apart from those which would be switched on intermittently.



Coffee in an Anderson shelter



Ordinary domestic washboilers are proving ideal for supplying large quantities of hot water and for cooking stews, etc., for communal feeding in rest centres and A.F.S. stations

This electric fire installed at an A.R.P. wardens' post serves both for providing warmth and for cooking light meals

Furthermore, the (now) early hour of "going to shelter" is resulting in the elimination of cooked evening meals. A further lost load is resulting from the earlier closing of offices and shops, and while the latter were last winter permitted a restricted form of window lighting, the raids have put a stop to this.

On the credit side there is the fact that consumption is going up in houses in which additional persons are now living. Also owing to the replacement of broken windows by opaque materials artificial lighting is often necessary throughout the day as well as at night-time. The discontinuance of shop window lighting, too, is causing many shopkeepers to make a special effort to render the interior of their premises as bright and attractive as possible.

Although there is less demand in domestic premises for what might be called the normal electric heating in the evenings, the leading of a "sheltered life" has, however, brought the electric fire into prominence as a means of providing warmth in between warnings. It is obviously uneconomical to light coal fires, in the evenings at any rate, and it seems only reasonable that the quick and intermittent heating which electricity is particularly well qualified to provide should be taken full advantage of. Moreover, with electricity, unlike other heating agents, the danger that the damage caused by a high explosive bomb may be augmented by an outbreak of fire is almost non-existent.

Private shelters, the smaller ones at least, warm up fairly quickly, but it has been suggested that a low-loaded unit of, say, 250-W for plugging into the lighting circuit might be useful to take off the initial chill. Higher wattage units, especially those of the reflector or bowl types, are likely to give too strong or concentrated a heat. With regard to public shelters, as these are now being made gasproof, electricity would appear to be the only form of heating suitable, and, in view of the recent official announcement regarding shelter heating there are likely to be considerable developments in this direction. In this case, in order to prevent the inevitable wilful damage, enclosed

heaters, perhaps of the tubular or panel types, are likely to be chosen and several undertakings are already seeking to discover the most suitable arrangements.

A further new opportunity for electric heating occurs in air-raid wardens' posts, A.F.S. stations, &c., and here radiators with 1- or 2-kW fire bar elements that can also be employed for boiling kettles, making toast, etc., are most popular. These facilities are very much appreciated by the civil defence personnel, some of whom actually use the apparatus to cook full-sized meals, a typical menu consisting of a stew, boiled vegetables and a pudding.

The changed conditions have also resulted in an unprecedented demand for other appliances, a demand which, owing to the restricted stocks available, it is found very difficult to meet. The widespread breakdown of gas facilities has, for instance, put a high premium on electric cookers (both standard and breakfast), hot plates and kettles, with the result that hotels, restaurants, public houses, &c., have been clamouring for apparatus to help them meet the needs of their customers. In this connection it is interesting to hear of helpful co-operation between the electricity and gas undertakings. In one district where the gasworks was put out of action the gas company actually assisted in getting the electric cookers installed. The " truce " is in fact now a reality in deed as well as in word, the *blitzkrieg* having done more to bring this about than all the pious wishes and good intentions.

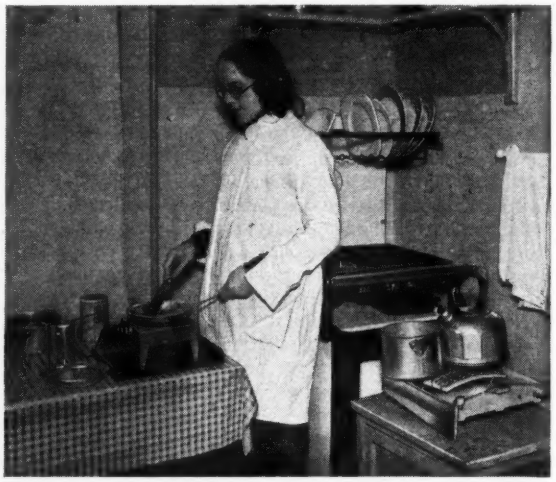
Then there is the unique situation brought about by the setting up of rest centres for the use of persons who have been bombed out of their homes. In these centres, although presumably they have been planned for some time, no provision has in most cases been made for supplying hot drinks, let alone hot meals. Here again the electricity

A breakfast cooker enables a well-known North-west London inn to supply its customers with hot meals when the gas supply is cut off

authorities have stepped into the breach with immediate service, generally surmounting the problem by installing ordinary domestic wash boilers, which prove ideal for the purpose not only of supplying large quantities of hot water, but also for cooking stews, &c.

This work of providing emergency facilities has been to some extent hampered by the restricted stocks of apparatus available, and the position is likely to grow worse as time goes on unless steps are taken to overcome it. There is, of course, a considerable quantity of apparatus now out of use in empty houses not only in bombed districts but also in certain East and South-east Coast areas, but the problem remains of getting permission to remove it and, having obtained permission, to get access to it. The large increase in demand for equipment in reception areas also does not help matters. At present manufacturers appear to have a fair stock of fires available, but a spell of cold weather will probably make a big inroad into this. Standard cookers, breakfast cookers and kettles are not easily obtained and there may be a case for the Ministry of Supply to reconsider the question of releasing the necessary materials for their manufacture if real hardship is to be avoided.

Taken all in all, the job of the electricity supply



An electric fire and hotplate form a useful stand-by for cooking in emergency

authorities and their staffs to-day is not an enviable one. Damaged plant and mains, the maintenance of existing supplies and the provision of emergency services, and the loss of consumers' load and revenue, all add to their anxieties, but it is an encouraging fact that despite all this nowhere in the affected areas have we heard talk of any immediate prospects for further increase in charges, though a worsening of the situation may demand revisions later on. Be that as it may, whatever else may be the result of this war, it is certain that electricity, on its performance of the past two or three months alone, has added very considerably to its prestige and this will have an immediate effect when normal development work is resumed.

Fuel Analysis

FUEL Survey Paper No. 44—" Methods of Analysis of Coal and Coke " (Stationery Office, 2s.), issued by the Department of Scientific and Industrial Research supersedes Survey Paper No. 7, published in 1927. It embodies the results of investigation into details of the earlier methods, together with additional methods for the analysis of coal, and—for the first time in this series of papers—methods for the examination of coke.

These methods have been developed by collaboration between the laboratories of the Fuel Research Station and its associated Coal Survey Laboratories. The principal changes in existing methods relate to those for the determination of volatile matter, nitrogen, phosphorus, and agglutinating value. Those included for the first time are for the determination of chlorine, arsenic and the forms of sulphur; additional methods are given for the determination of carbon dioxide and sulphur, and the section on the Gray-King carbonisation assay, previously dealing only with the low-temperature form, now includes a description of the apparatus and method for the high-temperature modification.

The appendices include one on the reproducibility of results, showing the degree of divergence to be expected between determinations made in the same laboratory or in different laboratories. Another deals with the methods of reporting results, and particularly the method of calculating them to the mineral-matter-free basis or pure coal substance.

Wartime Factory Lighting

Compliance with New Regulations

LIGHTING in industrial establishments under war conditions was the subject of a paper by Mr. R. O. Ackerley read at a joint meeting in London on November 27th of the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS and the INSTITUTION OF ENGINEERS-IN-CHARGE. While some fresh aspects had been introduced, the author considered them to be secondary to the simple accentuation resulting from war conditions of some of the factors that had to be contended with in peacetime, such as the vital necessity of providing sufficient and suitable light for the work being done.

To maintain the production level industrial premises should be completely " blacked out," so that there need be no limitation of any kind of the amount of light that could be used inside. How good illumination could improve the volume and quality of production and welfare of operatives was recognised by the Government Departmental Committee on Lighting in Factories whose fourth and fifth reports contained substantially the same recommendations, with the important exception that the recommended minimum illumination for working areas had been increased from 1 ft.-candle at floor level to 6 ft.-candles at 3 ft. above floor level. This very startling increase in less than two years was undoubtedly due to factors introduced by the war.

The Ministry of Labour, which had taken over from the Home Office the responsibility for this particular aspect of industry, accepted the fifth report recommendations practically *in toto* and drafted legislation to make their adoption compulsory in all factories working more than 48 hours per week. The new regulations should become effective in law within a few weeks. Their main intention was to indicate what was meant by the terms " sufficient and suitable " illumination, and Mr. Ackerley proceeded to explain that the 6 ft.-candles minimum requirement was qualified by the statement that it was " without prejudice to the provision of any additional illumination required to render the lighting sufficient and suitable for the nature of the work " being done. Therefore only by furnishing values of the order of those indicated in the Illuminating Engineering Society's Code could industrialists feel reasonably satisfied that their installations would comply with the legal requirements.

The 0.5 ft.-candle at floor level called for in corridors, on staircases, and similar parts of factories was also of importance because this minimum would need to be adjusted in relation to actual standards obtaining inside the shops, to avoid too great contrasts.

Minimising Glare

As regarded suitability, compliance with the main glare clauses would generally result from the employment of reflectors designed to B.S.S. 232, with a 70 deg. cut-off skirt. While this would look after direct filament glare, it was quite useless to prevent reflected glare of the filament from polished surfaces. Therefore the brightness of the whole visible area of fitting and source must be less than 10 candles per sq. in., which meant that some sort of industrial diffusing fitting must be used, such as the " Glassteel " type, or 5-ft. fluorescent tubular lamps in appropriate trough reflectors.

Minimum mounting heights were suggested by the author, who pointed out that the new regulations required local lighting to be shielded from all workers, not merely from the particular operative working the machine on which the lamp was installed. It was useless to install diffusing fittings overhead if local lamps were allowed to cause reflected glare. When the nature of the work made both types of lighting necessary the ratio of local to general intensity should never exceed ten to one, unity (general) never being less than 6 ft.-candle. In most cases standard dispersive or industrial diffuser-reflectors, spaced as their makers recommended, would overlap light sufficiently to prevent deep shadows.

Psychological problems introduced by the " black-out " were referred to, the author mentioning how helpful in this respect was the brightening of backgrounds by artificial means and the occasional inversion of reflectors to direct some light on to ceilings. He turned next to means of preventing light showing outside buildings and, finally, dealt with the various degrees of illumination permitted for exterior lighting and B.S. fittings for this purpose.

D*

Shelter Warming

E.D.A. Notes and Suggestions

PARTICULARS of the physical characteristics to be allowed for in the heating of air-raid shelters are given in the E.D.A. *Bulletin* for September-October. It is pointed out that the earth below ground level is colder than the air above only in the summer, the temperature range lying between 64 deg. F. (August) and 38.5 deg. (December) at 6 in. below the surface; at 10 ft. below the surface the corresponding figures are 57.5 deg. (September) and 47.5 deg. (April). The rise in temperature in an underground shelter is, therefore, greater than in a similar construction above ground where heat is carried off by cold air. In order to avoid overheating in the former case, the soil should be rammed home between the walls (which should not be of wood or asbestos) and the surrounding earth.

Shelters in large basements can be regarded as positively ventilated if natural ventilation equals 150 cu. ft. per hour per person, corresponding to four changes per hour for a trench for fifty persons. This is more than can be expected during periods of occupation, and calculations for artificial warming should assume two changes only per hour and be based mainly on heat loss through walls, floor and ceiling. The value of the latter may be judged on the basis of surface area per person, which varies for a three-hour period of occupation from 75 sq. ft. for a gas-tight shelter to 20 sq. ft. with ventilation at 150 cu. ft. With less natural ventilation, 25 sq. ft. per person is equivalent in surface area per ft. run to a trench 5 ft. 6 in. wide by 7 ft. high.

A total heat dissipation at maximum summer temperature of 400 BThU per hour (117 W) per person can be assumed. In winter, with warmer clothing, a much lower figure than 25 W per ft. run (equivalent to the 1 W per cu. ft. used for ordinary space heating calculations) should be taken except for preliminary warming up. Probably the problem should be regarded as one of drying out and airing the structure rather than of warming the occupants.

A convector designed to circulate high-velocity currents of air and occasionally moved, if the trench is long and narrow, gives good results. Experiments are being carried out with iron wire strung under the benches and supplied at low voltage.

Heat losses from brick surface shelters are similar to those of an ordinary building. In a 50-person type, 32 ft. 6 in. by 7 ft. 6in. by 7 ft. 6 in. with 13½-in. walls, the heat loss is 5,300 BThU (1,550 W) for a 20-deg. difference in temperature, which is ample for airing. An open doorway at one end and a few air bricks will provide two changes per hour, giving an additional loss of 1,430 BThU (420 W), bringing the total to about 2 kW or just over 1 W per cu. ft.. which could be provided by a convector or tubular heater. Experiments are being made with a simple heater with thermal storage capacity to allow for switching out during peak hours.

For wiring, lead-covered cable (preferably with separate earth wire) or c.t.s. may be satisfactory when adequately protected, but as a rule screwed conduit should be employed. Any increased danger of shock in corrugated-iron shelters, especially after damage by bombing, can be guarded against by bonding the frame of the heater to the metal. For private Anderson shelters a 300-W reflector fire fixed at the top of the back wall may be suitable or one of heavier loading if used only for pre-heating. Elements wound for low voltages are obtainable. A 100-W lamp in a biscuit tin also gives good results.

High Spot Detection

A NEW method of locating uneven places when finishing tools and gauges or scraping bearings has been devised by Mr. H. G. Griffiths of Aberdeen University, with a view to obtaining increased accuracy and speed unaccompanied by eyestrain. Instead of Prussian blue or jewellers' rouge (which are often difficult to discern in ordinary light and may cause spurious high spots), powdered anthracene in medicinal paraffin oil is used as a coating for the surface and the work is inspected under the rays of an Osira 80-W or 125-W " black glass" lamp fitted with a simple concentrating reflector. The high spots fluoresce brilliantly enough to be discerned in a normally lighted room and after the high spots have been scraped, the remaining fluorescent material can be cleaned off with a rag moistened with benzine.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Lighting Terminology

IN his letter appearing in your issue of November 22nd, Mr. Batson states that I am "at fault." I suggest that he reads my article again. He will then see that I have quoted B.S.S. 233 correctly as regards the definition of "efficiency" and proceed to deprecate the application of the same term to lighting fittings.

There are still many weak spots in this relatively new "science of seeing," although rapid progress has been made of recent years Mr. Batson puts his finger on one when he inquires how to measure diffusion under the specific conditions stated by him. Konrad Norden devised a standard shadow caster for attachment to a photometer, but the British Committee was still at grips with this problem when its work was suspended. Presumably we shall have to wait until after the war for a solution. In the meantime, however, I consider that it is most serious to ignore this most important factor in the provision of good seeing conditions.

An observer of average height in average coloured clothing gives results which line up very closely with those which would be computed. It is the position of worst or most serious shadow which is the criterion and it does not matter whether the worker actually obscures this position. However, the subject is too deep to discuss at length in a letter.

In the first sentence of his fourth paragraph Mr. Batson does not agree with something which does not appear in the article. Nevertheless, that a uniformity of 70 per cent. or higher is obtainable with R.L.M. reflectors used within the $1\frac{1}{2}$: 1 spacing ratio limit is proved by installations being carried out daily. As pointed out in B.S.S. 398 a reasonable number of fittings has to be considered. The phenomenon, which Mr. Batson mentions, of producing a higher illumination between fittings than that immediately under them, is due to consideration of too small a number.

Finally, the symbol "S" for area was taken from the Technical Paper—"The Terminology of Light & Vision"—recently quoted by you in a leaderette. Should there now be any points on which he is not clear, perhaps Mr. Batson will speak to me on the telephone.

HOWARD LONG, M.I.E.E., F.I.E.S.

Birmingham, *November 22nd.*

Cable Maintenance

I have read Mr. M. Cline's article in the ELECTRICAL REVIEW of November 15th with considerable interest, and would add that I am in complete agreement with him regarding emergency cable jointing, particularly where he refers to the speed at which moisture will find its way along the insulation of oil and resin-compound impregnated papers. Too much emphasis cannot be laid on the necessity for ensuring that a point where the cable and insulation are sound is reached when cutting-back to connect a new length of cable in place of a length damaged by a bomb.

Might I suggest that when using emergency wooden cable joint boxes, an iron cradle or similar device be used for securing the cable on either side of an emergency joint box. Such an accessory has been found effective to prevent even slight movement of the cable, which could permit the joint itself to move and possibly result in reduction of the adequate margins of safety allowed in such boxes when the jointed conductors are in their normal positions. The cradle and clamps also provide the necessary low resistance bond, and a simple yet effective cable support is provided.

In addition, if the cables happen to move, the plastic compound used for sealing the point of entry of the cable to the box, will be disturbed and permit the cold-pouring compound or hot-filling compound to leak out so long as they remain in a fluid state. Once either is set trouble with leakage does not occur, but until they have done so, it is essential that the plastic-compound seals should not be disturbed. Plastic compound should be applied to the inside of the box to withstand the pressure of the weight of the mass of compound, rather than outside, where such pressure can easily force the compound away from the wood and permit leakage.

I would like to suggest, as a preferable alternative to Mr. Cline's "normal compound which has been heated and allowed partly to cool" (assuming as he does that cold-pouring compound is not favoured by the engineer and, therefore, not in stock), that a hot-filling compound specially prepared for emergency work be used. Such a grade has a lower pouring point—about 70 to 80 deg. C.—than normal Class 2 type joint-box compounds, and it can, in consequence, be heated to that pouring temperature range and poured with the knowledge that it has equally free flowing properties at, say, 75 deg. C. to a normal Class 2 type compound at 135 to 150 deg. If a compound of the latter type were allowed partly to cool, its viscosity at the lower temperature at which it might be poured would not ensure the free flow of the compound quickly into every part of the box and, what is most important of all, into the emergency joint.

A temporary emergency speed cable joint may have to remain in commission for some weeks—ample time for ionisation to develop in a pocket or the crutch—and it is essential, therefore that the hot-filling compound should be fluid enough to prevent "veiling" any part of the emergency joint. A special hot-filling compound for the work fulfils these requirements, whereas it would probably be a distinct disadvantage for a normal type Class 2 compound to be very fluid at 70 to 80 deg., since leakage from the ordinary cable box, inless it had machined joints, would almost certainly occur. The special hot-filling compound cools quickly, enabling the voltage to be applied without undue delay, while it can be and has been applied very shortly after completion of filling with the compound still quite hot and relatively fluid.

In the closing paragraph of his article Mr. Cline refers to co-operation between neighbouring authorities for inter-loan of personnel and materials. Here I would add a word of warning based on personal discussions with engineers who have tried some of the several makes of cold-pouring compound on the market and then announced their preference for a hot-filling compound. Due to the varying proportions of insulant and hardening agents in which the various brands have to be mixed —one may be 7 to 1, others 4 to 1, $2\frac{1}{2}$ to 1, 50/50, etc.—a jointer used to, say, a 4 to 1 mixture might quite easily make a mistake if lent to an area where a 7 to 1 mix compound is stocked, especially if making it up in bulk to save time in filling a large box, and particularly if the work is being done under emergency conditions.

Cold-pouring compounds have been proved to be excellent insulants, but they are not completely foolproof and require reasonable care and attention in handling and preparation to ensure good service.

I hope the foregoing remarks will be acceptable to Mr. Cline and mains engineers as a constructive addition to his extremely interesting article.

E. L. DEACON,
Manager, Electrical Dept.
DUSSEK BITUMEN & TAROLEUM, LTD.

London, E.3,
November 25th.

Technical Training

With reference to "Thrice Chartered's" recent letter and subsequent correspondence, it must be remembered that the purely practical engineer is the child of the scientist. I agree, that the practical engineer should receive recognition, but do not let us sacrifice the courses at our universities and technical colleges to this end. These courses are designed to train a man's mind to think along correct lines, rather than to work by rule-of-thumb methods.

The study of science enables us to predict what is going to take place under a given set of conditions without having to resort to practical experiment. A considerable amount of time and money is therefore saved, which I think in the present emergency is most important.

Let our aims be a combination of the present theoretical standard of education with the corresponding standard of practical experience.

A + jb.

November 23rd.

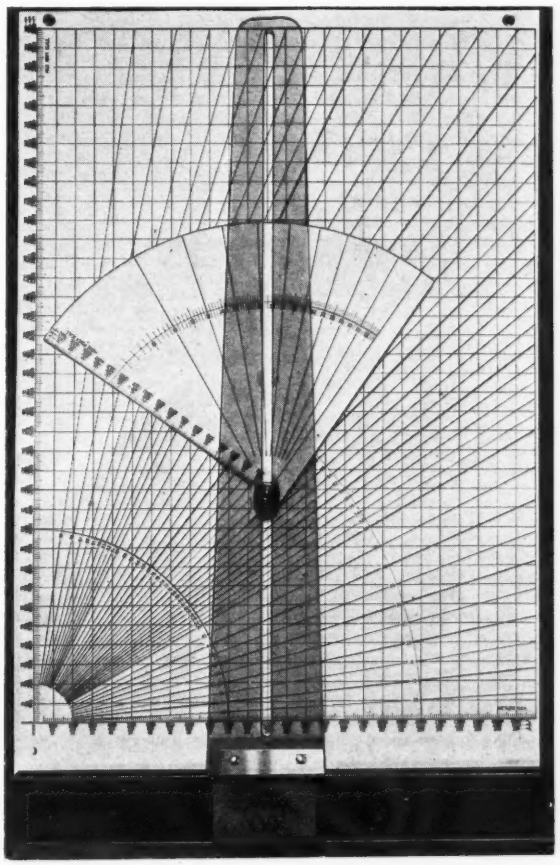
POWER FACTOR CALCULATOR

Complicated Determinations Simplified

SOME engineers prefer graphical and others mathematical means of making power-factor correction calculations, but the majority of the staffs of electricity supply undertakings or of large power consumers, who only occasionally meet with problems of this nature, will find it much more convenient to use the simple mechanical calculator devised by the Metropolitan-Vickers Electrical Co., Ltd., which also provides a ready means of checking results obtained by the more elaborate methods employed by those with everyday experience of such problems.

The "Metro-Vick Mulligan" calculator consists of three essential parts:—(a) A base chart with vertical and horizontal scales, reading kW, and wattless kVA, respectively, and radial lines indicating power factor; (b) a quadrant scale indicating HP (edge scale) and power factor (radial lines); and (c) a combined horizontal and vertical cursor to which the quadrant scale is attached on a pivot sliding in a vertical slot on the cursor. The combined horizontal and vertical movement of the cursor enables the pivot of the quadrant to be placed in any position on the base chart.

The calculator can be applied to many purposes, the chief of which are as follows:—1. To determine the leading power factor required of a synchronous-induction or synchronous motor of given HP in order to correct the lagging power factor of the total load to a predetermined power factor. 2. To determine the kVA of a synchronous or static condenser required to correct the lagging power factor of a given load to an improved predetermined power factor. 3. To deduce the kVA and the power factor of a load after removal of part of the load of known power factor. 4. To determine the kVA, kW, wattless kVA or power factor of a load when any two of these values are known.



The "Metro-Vick Mulligan" p.f. calculator

The application of the calculator may be illustrated by one example out of the many that offer themselves. Assuming an existing load of 1,200 kW to have a lagging power factor of 0.7 and that it is desired to add to this load a 400-HP synchronous-induction motor and to correct the power factor of the total load to 0.9 lagging, find the leading power factor of the motor.

First, locate the value of 1,200 kW on the kW scale on the base chart. Then, read horizontally across from this value until the radial line for 0.7 power factor is intersected; move the cursor horizontally until the centre of the slot is over this point. Move the quadrant vertically until its pivot is also over this point and lock in position; keep the HP scale on the quadrant vertical and locate the value of 400 HP (quadrant edge scale). Read horizontally across from the 400-HP point and to the left, until the radial line for 0.9 power factor is intersected; swing the quadrant counter-clockwise until the edge scale coincides with this point. Read the leading power factor of 0.57 on the circular scale of the quadrant through the centre of the cursor slot.

The calculator is bound in a leatherette covered box-form folder, with cellulose finished scales and strongly constructed cursor and is provided with full working instructions, including further examples of its application.

Protecting Electrical Plant

American Defence Measures

IN view of the steps which have been taken in this country to safeguard power stations and distribution systems from war damage it is of peculiar interest to read in the *Electrical World* of a memorandum prepared by the United States Army Department containing recommendations upon the same subject.

The recommendations are purely voluntary at present and are directed primarily at new plant construction, but the proposals are expected to channel the thinking of many other manufacturers seeking to make their plants impregnable.

At least two independent sources of essential power are proposed in the recommendations for "minimum passive defence protection." Where ample power is available from commercial sources it is suggested that this can be accomplished merely by having two separately routed lines to different connecting points on the distribution or transmission system. Otherwise, the plan suggests ultimate installation of a local standby generating plant of sufficient capacity to carry the essential load during interruptions.

It is recommended that all power and telephone lines on the plant site should be put underground. Outdoor electrical equipment—transformers and oil switches—should be placed in subterranean vaults or otherwise protected against damage.

The recommendations also propose specific measures to ensure "blackout" without interruption of operations. Complete sealing of the plant, it is pointed out, requires provision for artificial ventilation. External lights should be so placed that operation of transportation facilities and movement of pedestrians are possible in the plant vicinity under dim blue lights. In general, light fixtures should be of a type to preclude upward beams and should provide for ready installation of blue covers.

In constructing new plants the Army deems it advisable, but not essential, to disperse the various buildings so as to form an irregular pattern, with adjacent structures not closer than 100 yards apart. Where practicable complete individual operating units are desirable so that destruction of one key unit will not stop operation of the entire plant, a factor which would involve distribution of electrical facilities.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

At a board meeting of Drake & Gorham, Ltd., held on November 15th, **Mr. F. Jarrett** was appointed a full director of the company, after fifty-one years' continuous service. He joined the company in December, 1889, as accountant, was appointed an employee managing director in January, 1932, and secretary in April, 1934. The chairman paid tribute to the valuable service which Mr. Jarrett had rendered during this long period and regretted that he found it necessary to resign his position as secretary, but was glad to feel that his experience and judgment would still be at the disposal of the board. At the same meeting **Mr. W. W. Parker,** who joined the company in December, 1912, and was appointed an employee managing director in November, 1936, was appointed secretary of the company, in succession to Mr. Jarrett.

Mr. R. K. Fleming of the Igranic Electric Co., Ltd., has been appointed to the board of that company. Mr. Fleming was apprenticed to mechanical engineering with D. & J. Tullis, of Clydebank, and was later with Jas. Howden & Co., of Glasgow, in their engine and turbine test section, during which time he had technical training in electrical engineering. Subsequently, he had a wide general experience in mechanical and electrical engineering and later became chief engineer at Lockburn Ironworks, Glasgow. He then joined the Harland Engineering Co., as superintendent engineer for Scotland. Sixteen years ago he joined the Igranic Electric Co., at Bedford. After a period at the works he was appointed manager for Scotland, in Glasgow. Later he was transferred to head office in London and for the past three years has been general manager at the Bedford works.

Mr. R. K. Fleming

Mr. H. J. Enion

Mr. J. H. Enion, who has also been appointed to the board of the Igranic Co., received his early training with Bertram Thomas, Ltd., Manchester, and with the Lancashire Dynamo & Motor Co., Ltd., Trafford Park. In 1911 he joined the Adams Manufacturing Co. in London. In 1913 the Igranic Electric Co. was formed, acquiring the Bedford works and the electrical engineering branch of the Adams Co.'s business. Mr. Enion joined the new company at its London office. In 1914 he was transferred to Glasgow as manager for Scotland. He returned to London in 1919 and in 1933 was appointed general sales manager.

Mr. J. H. Jones, branch manager at Devizes of the Wessex Electricity Co., for the past fifteen years, who has been promoted to district manager of the Shaftesbury district of the company, was recently entertained to a farewell supper at the Crown Hotel, Devizes. Mr. E. Jordan, district manager, who presided, presented Mr. Jones with a mahogany electric clock on behalf of the district staff, and with a cigarette lighter and a fountain pen from the staff of the Devizes branch. Mr. Jordan took the opportunity of congratulating **Mr. A. W. Williams,** of Melksham, on his appointment as branch manager at Devizes, and welcomed to West Wilts **Mr. S. E. Butler,** of Wallingford, who has been appointed branch manager at Melksham in succession to Mr. Williams.

At the recent annual meeting of the Association of Public Lighting Engineers, **Mr. E. J. Stewart,** superintendent of public lighting at Glasgow, presiding, the president, officers and council were re-elected for the period of the war or until a further decision is taken at the next annual meeting. **Mr. W. N. C. Clinch,** borough electrical engineer of Brighton, was elected vice-president in the place of the late Mr. H. W. Gregory.

Major E. S. Saunders, O.B.E., M.I.E.E., received permission from the London and Home Counties Joint Electricity Authority to terminate his appointment on November 30th, in order to take up a position in the Ministry of Aircraft Production.

Mr. F. R. Croudace, assistant electrical engineer to the Bedlington Coal Co., Ltd., is leaving to take up a similar post with Hartley Main Collieries, Ltd., and has received a presentation from Bedlington miners. Mr. Croudace has been with the Bedlington Coal Co for twenty-five years.

Mr. H. W. Mellor, of the Yorkshire Electric Power Co., Ltd., has been appointed junior assistant mains engineer at Oldham.

Merz and McLellan announce that they are taking into partnership **Mr. C. L. Blackburn** and **Mr. T. G. N. Haldane,** who have been members of their staff for a number of years.

Councillor Mrs. Gregory has been elected Deputy Mayor of West Ham. She is a member of the National Executive Committee and past-chairman of the Electrical Association for Women.

Mrs. F. E. Balley, chairman of the Bristol branch of the Electrical Association for Women, recently presented **Mrs. B. Avis,** honorary treasurer, who has retired after eight years in this capacity, with a diamanté brooch and clips. **Mrs. L. Richards** has succeeded Mrs. Avis as honorary treasurer.

At the recent annual conference of the New Zealand Electrical Traders' Federation, **Mr. J. M. Fleming,** of Wellington, was re-elected president for the ensuing year.

Mr. R. B. Waterston has been appointed a member of the South African Electricity Supply Commission for a further period of three years.

The London Students' Section of the Institution of Electrical Engineers is to hold a tea dance on Saturday, December 14th, from 3 to 5.30 p.m. at the Oak Restaurant (Slaters), 18–24, High Street, Kensington, W.

Obituary

Mr. C. H. Yeaman.—As we go to press we learn with great regret of the death of Mr. C. H. Yeaman who was city electrical engineer of Stoke-on-Trent for many years until his retirement in March last. A fuller note on Mr. Yeaman's career will appear in our next issue.

Lord Tryon.—The death occurred last week of Lord Tryon who, until the recent Government changes, was Postmaster-General.

Mr. W. C. Barry, chief clerk and sales manager of the Wisbech Lighting Co., died recently on his fifty-first birthday.

Mr. A. J. Hanson.—*Erda* (Sydney) reports the death of Mr. A. J. Hanson, managing director of Lawrence & Hanson Electrical Pty., Ltd., one of the oldest-established electrical merchandising houses in the Commonwealth. Mr. Hanson had suffered indifferent health in recent years. He is succeeded as managing director of the company by Mr. A. R. Hanson.

Mr. A. E. Kaleski, another director of the Lawrence & Hanson Company, also died recently.

Wills.—Sir Joseph Thomson, O.M., Master of Trinity College, Cambridge, and Professor of Physics in the University, left estate valued at £82,601 (£82,348 net personalty). Among his bequests was £1,000 for the Cavendish Laboratory.

Councillor J. H. Tonge, M.I.E.E., the first engineer and manager of the old National Electric Supply Co., and later consulting electrical engineer, left gross estate of £28,607, with net personalty amounting to £27,273.

Mr. H. Clarke, a director of the Hallamshire Electric Co., left £5,157 (£4,143 net personalty).

Mr. A. D. Phillips, who was a director of the Derby & Notts Power Co. and other companies, left estate valued at £12,370 (£9,671 net).

Mr. Alexander Miller, secretary of Clyde Valley Electrical Power Co., Ltd., left personal estate valued at £7,294.

A Model Pump

THE accompanying picture shows a "Mopump" made by Rhodes, Brydon & Youatt, Ltd., and is actually a working model although it is only one twenty-fifth of full size, measuring a little over 2 in. to the eye bolt. The motor is a replica of a full-sized machine and was made by Brook Motors, Ltd. It operates at 12-V AC and 3,000 RPM. The pump is a model of the standard "Mopump" and is capable of supplying approximately two gallons of water per minute. It was presented to Mr. Youatt, Senior, to commemorate his twenty-five years as managing director of Rhodes, Brydon & Youatt.

A miniature "Mopump"

RULES FOR ELECTRICAL MINING—II

Recommendations of the Royal Commission on Safety in Coal Mines

By J. A. B. Horsley, O.B.E., M.I.E.E.

TO summarise clearly the recommendations regarding the use of electricity contained in the Report of the Royal Commission on Safety in Coal Mines, set out in the order in which they appear in the report, needs suitable side headings to indicate their purport. To avoid the pitfalls of paraphrase, verbatim quotations are used to convey specific proposals and expressions of opinion. Some of the extracts are concerned with ventilation and with the use of safety lamps, but the recommendations bearing directly upon the use of electricity are so bound up with ventilation standards that their effect cannot be understood properly without those extracts.

Electrical and mechanical staffs.—" We are impressed with the need for a higher standard of control in electrical and mechanical matters in view of the number of accidents arising from defects in plant as revealed by the divisional inspectors' reports, and the increasing importance of such matters consequent on the strides made in the mechanisation of mining and the application of electricity thereto " (page 169).

Electrical and mechanical engineers.*—" The Coal Mines Act, 1911, assigns no responsibilities to electrical and mechanical engineers. It may be regarded as an assumption that their work is purely advisory, that the mine manager is in a position to accept or reject their advice as he thinks fit, and that if he accepts it he takes full responsibility for putting it into effect, for giving the necessary instructions to his subordinates at the colliery and for all the consequences, whatever they may be. That is, in fact, his present legal position, if any breach of the law is involved."

" We do not think it right to relieve an engineer of statutory responsibility to this extent, and we recommend that in any matters in which he takes part whether through the superior officials or in direct relation to an individual manager he should share the responsibility " (pages 169-171).

In his first article, published in the November 29th issue of the " Electrical Review," Mr. Horsley reviewed early regulations and those now in force. This one summarises the recommendations of the Royal Commission on Safety in Coal Mines. The concluding article will indicate the effects of the proposals of the Royal Commission in relation to existing requirements.

Colliery electrical staff.—" General Regulation 131 (b) requires the manager to appoint in writing an electrician to supervise the electrical apparatus in, or at the surface of, the mine and if necessary an assistant, or assistants to the electrician; but, except for the provision that every person appointed to work, supervise, examine, or adjust, any apparatus shall be competent for the work that he is set to do and that the electrician must be over 21 years of age, no qualifications are prescribed by which the competency of the electrician or his assistants is to be judged " (page 171).

" Some means of ascertaining whether an electrician is properly qualified for appointment is urgently desirable " (page 172).

" Moreover, it would be unreasonable to expect electricians to undertake personal responsibility in matters requiring a high standard of technical knowledge, experience and skill without adequate professional qualifications for the task, and we believe that the mining industry will always have difficulty in attracting and retaining electrical staff of the requisite training and character without such improvement in status and remuneration as will enable it to compete with other electrical employment " (page 172).

" We believe that a raising of status and remuneration will automatically accompany statutory certification, and that this in time will enhance the attraction of electrical employment in the mining industry and so result in an all-round improvement in the standard of the staff " (page 172).

" We agree . . . that there should be two grades of certificate, a Grade I based on a written examination and a Grade II based on an oral examination, each coupled with suitable requirements as to age and previous experience " (page 178).

" We recommend that, when the scheme of certification is in force, every electrician in charge appointed under General Regulation 131 (b) should be required to hold a certificate; a Grade II certificate would suffice at mines where (i) the electrical pressure does not exceed 650 V; and (ii) the aggregate capacity of the installation does not exceed 250 kW; and (iii) there is no electrical apparatus in use which is required to be of approved flameproof type."

" Any assistant electricians appointed under General Regulation 131 (b) should be required to hold Grade II certificates " (page 173).

" In order to provide the electrician and his staff with sufficient authority, opportunity and facilities for carrying out the examinations and tests required by General Regulation 131 (c), we recommend also that the manager be required to specify in detailed written instructions how these duties are to be exercised."

" The instructions should include the frequency with which such examinations and tests shall be made with respect to each class or description of cable or apparatus in use, and how often if at all, it is to be taken to the surface for the purpose, in order to ensure, *inter alia*, that flameproof apparatus is maintained in flameproof condition and that all the automatic protective features of switch and control gear are in good mechanical and electrical operative condition and capable of functioning when required " (page 174).

Standards of ventilation as to firedamp content.—" The only record of the presence of firedamp which the law at present requires is that made in the deputies' reports under Section 64 (3) [of the Coal Mines Act, 1911]; the reports are to be full and accurate, but there is no specific requirement that the estimated amount of firedamp found shall be recorded " (page 216).

" The inspectors from time to time take samples of the mine air for analysis . . . "

" At some mines also the management makes a practice of having samples taken regularly, analysed either in the laboratory or underground by means of a portable apparatus . . . and recorded so as to give a picture of the conditions and enable the state of the district to be watched."

" But there is no statutory provision for systematic tests of the firedamp content of ventilating currents, with a record of results . . . " (page 216).

" Apparatus is now available by which reasonably accurate determinations of the firedamp content in the air can be made on the spot " (page 218).

" In the circumstances we consider that it should be a general requirement that the sampling should be done by means of apparatus, approved by the Mines Department, capable of indicating on the spot the percentage of firedamp present " (page 218).

Systematic sampling in safety lamp mines.—" The frequency of the sampling should depend on the gassiness of the ventilating district in which the samples are taken."

" In districts in which electric power is not used within 300 yards of the working face, we propose that the sampling shall be done monthly if the firedamp content at the return end of any face is less than 0.75 per cent., weekly if it is more than 0.75 per cent., but less than 1.25 per cent., and daily if it exceeds 1.25 per cent."

" When electric power is used within 300 yards of the working face the sampling should be done daily if the content exceeds 0.75 per cent., but we shall discuss that aspect of the matter more fully in a later chapter " (page 218).

Ventilating conditions governing the use of safety lamps.—" The provisions of Section 32 (1) (a) [of the Coal Mines Act, 1911] are not sufficiently effective in practice, owing to the standard of ventilation laid down not being high enough to require the use of safety lamps in many of the mines in which they are in fact used throughout because the management thinks it necessary to do so in the interests of safety " (page 311).

" We recommend, therefore, that Section 32 (1) [of the Coal

* The term engineer is used here to signify an engineer of professional standing and attainments who is not subordinate to the mine manager, in contra-distinction to electricians and mechanics who are appointed by the mine manager and are usually directly controlled by him.

Mines Act, 1911] be so amended that no lamp or light other than a locked safety lamp shall be allowed or used in any seam unless (*a*) the seam is one in which no inflammable gas has been seen on the lowered flame of a safety lamp in any road or working which has not been abandoned ; or (*b*) an exemption from the use of safety lamps has been granted by the district inspector in accordance with general regulations " (page 317).

Ventilating conditions governing the use of electricity.—" Under the present law no standard of ventilation is laid down to determine whether or not electricity may be introduced, Section 60 (1) of the Coal Mines Act, 1911, merely provides that electricity shall not be used in any part of a mine where, on account of the risk of explosion of gas or coal dust, the use of electricity would be dangerous to life, and it is left to the divisional inspector to decide, subject to the manager's right of appeal, whether the conditions are dangerous or not " (page 346).

" It is provided, however, in sub-section (2) of Section 60 that if at any time in any place in the mine the percentage of inflammable gas in the general body of the air in that place is found to exceed 1¼, the electric current shall at once be cut off from al cables and other electrical apparatus in that place, and shall not be switched on again as long as the percentage of inflammable gas exceeds that amount; it must be assumed therefore that the legislature did not consider the occasional presence of 1¼ per cent. of firedamp as sufficient to justify an inspector in requiring electricity not to be installed " (page 346).

Systematic Sampling of Air

" While it is the practice for the inspectors to take samples of the mine air for analysis on receipt of a notification that electricity is to be introduced, they are left, in the absence of any provision for systematic sampling, without specific information as to the state of the ventilation subsequently, unless they have some particular reason for undertaking a special check."

" The position in this respect will, however, be fundamentally modified if our proposals for regular systematic sampling are adopted " (page 347).

" Moreover, the inspectors' general power of objection should be reinforced by a specific prohibition against the introduction of electricity within 300 yards of any working face if any one of six consecutive weekly samples taken at the return end of the face (or elsewhere if so directed by the inspector) shows a firedamp content in the general body of the air exceeding one per cent." (page 347).

" Accordingly, as already recommended . . . the arrangements for systematic air-sampling in safety lamp mines should be intensified in the districts in which electricity is installed within 300 yards of the face, and if the firedamp-content exceeds 0.75 per cent. the measurements should be made and recorded daily, and should be checked by analysis weekly."

" If at any time the firedamp content is found to exceed one per cent., the manager should be under statutory obligation to have the current at once cut off, and not to permit it to be switched on again until he is satisfied that the firedamp content does not exceed one per cent., and, if there is a defect in the ventilation, that defect has been remedied " (page 348).

" As regards the cutting-off of current by officials or other persons on the spot who are provided only with flame safety lamps for the purpose of detecting inflammable gas, we recommend that the cutting-off point should not be defined in terms of a specific percentage of firedamp, as it is at present in Section 60 (2) of the Act (namely 1¼ per cent.), but in terms of what can be seen on the lamp, as in No. 132 (v)* of the General Regulations of 10th July, 1913. The current should be cut off as soon as any indication of firedamp can be seen on the lowered flame of the lamp " (page 348).

Flameproof enclosure of electrical apparatus.—" However much care is taken to maintain a high standard of general ventilation . . . there is always the risk of something unforeseen happening which results in the presence of an explosive mixture. We think it necessary, therefore, to provide a second line of defence to prevent an electric spark from igniting the mixture in such circumstances " (page 349).

" We recommend accordingly, that in safety lamp seams flameproof enclosure should be required for all electrical apparatus (other than shot-firing, signalling, or telephone apparatus, to which the existing requirements will continue to apply) installed within 300 yards of the face, and elsewhere in the seam wherever the representative gas content exceeds 0.5 per cent." (page 350).

" We accordingly recommend that all electrical apparatus required to be flameproof shall be of type approved by the Mines Department and that this requirement shall come into force forthwith ; if, however, the apparatus (though not of officially certified type) already complies with General Regulation 132 (i), a period of three years might be allowed for its replacement, and in special cases this period could be further extended by the general power of exemption in General Regulation 137 (a) " (page 350).

Fire risks with electrical apparatus.—" For fires of electrical origin the use of water in the early stages is open to objection owing to the risk of electric shock, though sand, as required by General Regulation 122 (c), or stone dust, or suitable chemical extinguishers, may be used safely and effectively."

" In order to prevent a fire of electrical origin from spreading we recommend that no fixed switchgear or electric motor be installed within a prescribed distance of any inflammable material " (page 363).

Amendment, generally, of existing electrical regulations.—" Nearly all the accidents from electricity other than ignitions of firedamp are the result of electric shock, and the majority of these when occurring below ground are associated with flexible cables, plugs and switchgear."

" The recommendations we have already made with regard to the duties and competence of the electrical staff employed at mines should have considerable influence in ensuring a higher standard of maintenance, which in turn should be reflected in a reduction of the risks involved in the use of electricity both below and above ground. But it is also necessary that electrical plant should be kept up to date in the matter of quality, and in the adoption of modern mechanical or automatic safeguards."

" Insofar as this is to be done by regulation, it entails the overhauling and bringing up to date of the electricity regulations which have stood in their present form since 1913 and are now due for revision."

" In the course of the evidence we have taken, a number of recommendations have been made with regard to such matters, but we feel that the detailed examination of the electricity regulations is outside our terms of reference and could be better undertaken by a small committee of electrical engineers. We recommend that such a committee should be set up for the purpose as soon as possible " (page 367).

" There are, however, certain matters of general principle which have been particularly impressed on us during our inquiry and which we think might receive the committee's special consideration, in addition, of course, to the recommendations, insofar as they have a bearing on the committee's task that we have made . . . as to the qualifications and duties of electricians, and . . . as to the precautions to be taken against the ignition of firedamp by electricity."

General Principles Summarised

" These general matters may be summarised as (i) The desirability of using both below and above ground apparatus, cables and materials conforming to a standard not less than that laid down in the appropriate British standard specification, if any, in force at the time of installation, subject to a suitable period of grace being allowed for the replacement of cables and apparatus that fall short of this standard. (ii) The importance of greater stringency in the requirements for the automatic protection of circuits, including the use when practicable of remote control, and the earthing of the neutral point of alternating current systems. (iii) The desirability of requiring the use of metallic screens for flexible cables employed with portable apparatus. (iv) The desirability, as regards installations on the surface, of imposing more specific earthing precautions and of applying the requirements of the Electricity Commission as to the construction of overhead transmission lines " (pages 367-368).

" It will be for the committee to consider among other things the extent to which these provisions can properly and usefully be applied to DC systems, and the practicability of adopting some specified minimum standard of insulation resistance with which electrical apparatus in use in mines must comply " (page 368).

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* General Regulation 132 (v) has been revoked by No. 9 of the Coal Mines General Regulations (Firedamp Detectors), dated March 6th, 1939, and the following requirement has been substituted. " In every seam in which safety lamps are required to be used by Section 32 (1) (a) of the Coal Mines Act, 1911, an automatic detector of firedamp, of a type approved by the Board of Trade, shall be provided for use with any electrical motor in operation at the working face."

By No. 5 (b) of those regulations it is also required that " If a workman detects the presence of inflammable gas at any place where an electrical motor is in operation he shall inform the person appointed to work the motor who shall cut off the power therefrom."

TRANSFORMER MANUFACTURE

How a New Company is giving a lead in Standardisation

BEHIND the recent formation of the British Power Transformer Co., Ltd., as an associate of the British Electric Resistance Co., Ltd. lies an interesting story of enterprise and progress. Starting operations in 1927 with Mr. Paul Huhne as managing director, the latter company was engaged initially solely in the manufacture of "Berco" electric resistances of all kinds, but it was soon decided to extend production to cover the small transformers often required in connection with resistances.

From being more or less a sideline, the manufacture of these transformers steadily went ahead and new types were developed to meet a wide variety of uses. In fact, such an important part of the company's business did transformers become that in 1937 a separate department for their production was established under the management of Mr. C. F. Whitehouse. This department prospered and quickly outgrew the space available for it in the company's original factory, so that it became necessary to erect a new building on an adjoining site.

Coil winding is carried out on fifteen of the latest type of machines. Right : Putting the finishing touches to a batch of transformers for supplying metal rectifiers

With the erection of the new premises for use entirely for transformer production, a new company was formed with the same directorate but with a more appropriate title to take over this side of the work. The factory has just got into full production and a week or two ago we had an opportunity of visiting it to see something of the manufacturing methods adopted.

A general view of the assembly shop at the British Power Transformer Co.'s new works

Lowering a completed transformer into its tank ready for oil filling

Having a floor area of approximately 11,000 sq. ft., the factory is on two floors with a small separate building arranged as stores. The winding of the coils is carried out on the first floor on fifteen of the latest type of winding machines. These machines are situated in the position of maximum brightness, close to the south windows running the whole length of the factory. The company's range of transformers covers capacities from 1 to 500 kVA, special attention being given to power, distribution, and pole-mounted types. Apart from coils for these we also noticed some for use in chokes for smoothing DC supplies from rectifiers, for telephone services to reduce ripple, and for radio transmitters.

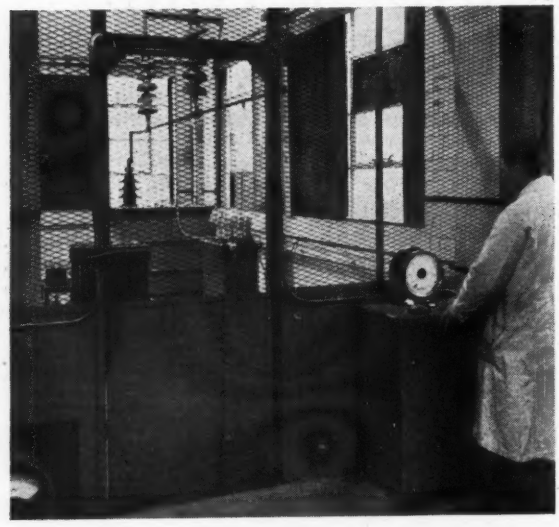
High-conductivity copper, insulated with double cotton or Egyptian tape, is employed for the windings. The low-voltage coils are usually of a spiral type and to keep them in position and to provide insulation to earth, elephantide edge blocks are securely taped at each end. A cross-over construction is generally used for the high-voltage coils, which are connected in pairs, inner end to inner end and outer end to outer end, each coil being separately taped and well insulated between layers. Spacers give horizontal oil ducts where required and in some cases disc windings wound from one length of strip conductor and having one turn per layer in each disc are employed.

After the winding is completed, the coils are taken in trays by lift to the impregnating plant on the floor below. Here they are thoroughly dried out in an electric oven before the impregnation process. A high degree of insulation is permanently ensured and each individual coil is rendered impervious to moisture. Moreover, the closely cemented turns and layers form a solid coil of considerable mechanical strength.

Each lamination of the core is insulated on one side to prevent circulating currents, and in addition strips of insulating material are placed in every step of the core. Passing on to assembly, the cores are rigidly clamped between angle iron or other suitable framework. In the larger sizes the core leg packs are held together by heavily insulated bolts to eliminate vibration while in the smaller sizes the laminations are held together by binding with tape.

The electrical design and actual construction of the cores combine to ensure minimum reluctance and stray fields, with the result that the fixed losses are exceptionally low and noise is practically eliminated. After the addition of the terminal

board and wiring up, the apparatus reaches the end of the assembly line, is lowered into its tank by the overhead travelling



Apparatus undergoing high-voltage tests

crane and receives its oil filling. The crane is also used to transport the completed unit into the test shop and on to the lorry for dispatch.

A specially interesting feature of the construction of the transformers are the steps taken to procure standardisation and so be able at any time to supply with the utmost dispatch models to suit every requirement. With this object in view, it was obviously impossible to have specially designed components for each individual instrument. Accordingly it was decided to standardise the clamp and terminal board and to vary the rating by altering the height and thickness of the coils. By keeping stocks of core laminations of different lengths and widths, already cut, on their own guillotines, it is thus possible to produce practically from stock apparatus to suit any requirements. In fact the company normally expects to be able to supply a 3-phase transformer of any type within seven days, and single-phase units in a shorter time : under present trading conditions these delivery times are inevitably somewhat longer.

The company is justly proud of its test room facilities which comprise all the latest methods. All apparatus is tested at every phase of production. Coils are tested individually for short circuit and open circuit, and all insulated core bolts are tested at 2,000 V to earth. After assembly each unit is subjected to full B.S.S. tests in a test bay which includes alternators providing various voltages at between 50 and 500 cycles, and e.h.v. pressure testing equipment. Transformers are tested for ratios by the ratiometer method, while iron and copper losses are checked by the two wattmeter method. Temperature rise is checked by thermometer and by increase of resistance. Overpotential tests of 100 per cent. are carried out at a frequency of 500 cycles, and pressure tests at twice the rated voltage plus 1,000 V, with a minimum of 2,000 V, together with full insulation tests. In addition, where absolute silence of operation is important, each transformer is tested as near as possible to its normal working conditions. The company makes the practice, when required, of forwarding certificates of tests to customers for approval before dispatch.

Appliance Approval in Australia

British Standards Adopted

MR. R. P. BOWER, Assistant Canadian Trade Commissioner at Sydney, New South Wales, has reported to his Government on the operations of the Standards Association of Australia since legal authority was given to it to maintain specified standards for all electrical appliances and accessories offered for sale.

It may be recalled that consequent on the depression of about ten years ago and intensified competition, certain manufacturers and traders in the Commonwealth placed on sale there electrical materials and appliances so inferior in workmanship and design as to be dangerous. At that time chain stores were offering toasters at about 2s. 6d. each and other appliances almost as cheaply. Serious accidents, some fatal, were ascribed to this faulty apparatus and agitation for some effective control grew so insistent that an Electrical Committee was appointed to advise the Commonwealth Government on the best methods of control of manufacture and sale. As a result the task of setting the standards was given to the Association.

It adopted, wherever possible, the standards that applied in Great Britain, and therefore an examination of any list of specifications issued by the Standards Association of Australia reveals frequent repetition of the phrase " British Specification No....., 193.., endorsed without amendment." If it was felt that the British specifications did not meet Australian requirements, they were amended to comply with local conditions, or else the standards of some other country (the United States or Canada) were adopted. " In this way," comments Mr. Bower, " the standards supplemented the preferential tariff arrangements with the United Kingdom, since, had the standards differed widely from those in that country affected products would be unsaleable in Australia despite any tariff preferences."

Mr. Bower points out that as Canadian standards for electrical items are generally closer to American than to English, it is sometimes difficult for Canadian-made electrical lines to qualify for sale in Australia without some modification in design. But he adds that imported lines can be approved even if they do not correspond exactly with the S.A.A. specifications, provided the Standards Association of Australia considers that they are not dangerous or likely to become so.

The Assistant Trade Commissioner describes the system of operation in New South Wales. There the task of indicating those items that shall be subject to these standards falls on the Electricity Advisory Committee of New South Wales (similar bodies exist in the other states). Upon approval of a recommendation by this Committee that in the interests of public safety it is desirable that articles of a certain type shall be subject to the control provided in the Act, a proclamation is published in the Government *Gazette* to the effect that after a certain period articles of this type may not be sold, hired, or offered for sale in New South Wales unless they have been approved by the prescribed authorities as complying with the established standards and have been marked as authorised. The specifications governing the particular item are published at the same time as the notice, when firms who are satisfied that their equipment complies with the regulations may apply for a " registered guarantee number " and may continue to offer their products for sale stamped with this number.

The prescribed authority has the power at any time to make a test of the equipment offered by a manufacturer or importer, and if it does not comply with the specifications for that particular item, penalties may be invoked. In cases where the distributors or manufacturers wish to have their appliances tested, arrangements can be made with the Standards Association of Australia and the registered guarantee number issued if the sample is satisfactory. In order to maintain uniformity of standards throughout the Commonwealth, provision is made in the regulations for the admittance for sale of appliances and accessories that have been approved for sale in any of the other States. A manufacturer or importer may be allotted the same registered guarantee number in respect of each of the applications made by him from time to time and may use the one number on all approved articles.

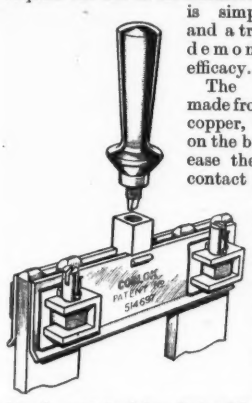
Mr. Bower considers, now that the war in Europe is interfering with deliveries from that area, that there is every chance that Australia may have to turn more and more to North America for those electrical supplies which she cannot produce herself and which she regards as essential. Further, he says, it is also possible that the standards will be modified to conform to Canadian practices if no sacrifice in safety is involved, or that guarantee numbers will be issued on a temporary basis.

NEW ELECTRICAL PRODUCTS

A Review of Equipment Recently Marketed

Convenient Fuse Link

A WELL-MADE fuse link has recently been developed and is now placed on the market by COSWAY (SALES), LTD., of Queen's Cross, Dudley, Worcestershire. This patent design (No. 514697) is of sound mechanical strength and easy to operate, and it ensures a quick break on withdrawal. The "Coslok" link was originally designed to conform to the modern tendency to eliminate bolts and nuts, which require the use of an insulated spanner. It is simply contrived and a trial sample has demonstrated its efficacy.



Neatly contrived fuse link with effective means of locking

The two blades, made from hard-drawn copper, are bevelled on the bottom edge to ease the entry of the contact posts, and at the same time assist in taking the arc on removing the link on load. A gun-metal pressure bolt goes through the blades and is actuated by a steel eccentric spindle fitted in a brass housing. Small stops are incorporated in the spindle and housing to prevent overwind. Curved steel springs are interposed on the outer sides of the blades, between the pressure bolt head and the blade on the one side, and between the spindle housing and the blade on the other. A brass lifting block floats in the centre of the link between the two blades, and is tapped to accommodate a combined link-remover and screwdriver (specially supplied and insulated).

To operate the link the eccentric operating spindles must be turned in an anti-clockwise direction as far as the stops allow by means of the link-remover-screwdriver handle, which is then screwed into the brass lifting block, and the link placed in position on the contacts. To tighten the link all that remains to be done is to turn the eccentric spindles in a clockwise direction, when very good contact can be assured.

The advantages claimed by the makers are that there are no screws or threads to strip or wear in the mechanism that tightens the link to the terminal post; the floating blades allow for a certain amount of out-of-alignment, which may occur in the terminal posts; and should any part become damaged, replacements can be quickly substituted.

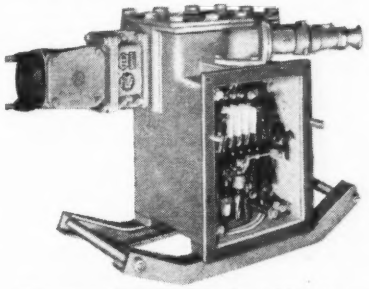
The "Coslok" link is made in three sizes with 3-in. centres for up to 150 A, 3½-in. centres up to 300 A and 3⅝-in. centres up to 500 A. High rupturing capacity cartridge fuses can also be fitted with the "Coslok" attachment.

Mining Drill Controller

The latest remote controller for mining drills operating at low voltage and normal frequency produced by M. & C. SWITCHGEAR, LTD., Kirkintilloch, Glasgow, is known as type A368; it has been certified at Buxton by the Mines Department. The flameproof enclosure is of welded steel plate, forming two compartments. One of them contains a 2-kVA transformer, three-phase air-cooled, with three primary windings for 440/550/660 V inputs, protected by three totally-enclosed fuses complying with B.S.S. 88. In each case the output is at 125 V for driving the drill. An auxiliary output winding furnishes 25 V single-phase with a tapping at 20 V for the control relay, which is self-aligning in action and operated remotely from the drill. This operating circuit is certified as intrinsically safe.

The associated triple-pole contactor has removable arc shields and renewable tips with a rolling motion under spring pressure, designed for the range specified by B.S.S. 775. The tails of all the transformer windings terminate on a common base for easy change-over. In addition to undervoltage protection there is an over-current solenoid, with two-pole silver contacts, which is adjustable with double time lags and is reset by hand from outside the case; a similar earth leakage solenoid is set at 12.5 per cent. of the full load for instantaneous tripping and can be reset only by an authorised person.

The second compartment of the flameproof enclosure is for separately housing a triple-pole externally operated isolating and reversing switch of the twin-break type, which is mechanically interlocked with both chamber covers, a padlock being provided for securing it in the off position. The incoming terminal is of the link box pattern, enabling cables to be sealed on the surface and connected by means of copper links. The socket and plug outgoing to the drill is of the four-pin


Flameproof remote controller with transformer for colliery drills

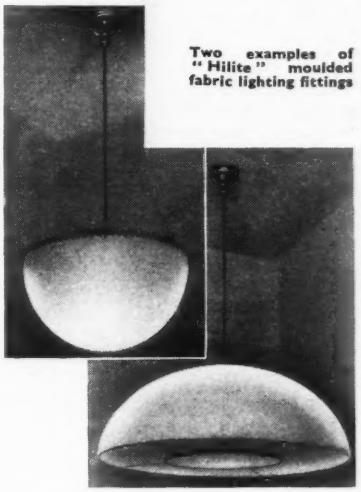
flameproof electrically interlocked type. This drill controller can be assembled in multi-panel form with coalcutter and/or conveyor remote control gate-end boxes.

Moulded Fabric Lighting Fittings

The use of "Canvex," a specially treated buckram, for the new range of "Hilite" lighting fittings by OSWALD HOLLMANN, 26, Hanover Square, London, W.1, has many advantages, especially at the present time. Foremost is the fact that, unlike glassware, the fabric is not splintered by bomb blast and, furthermore, it is washable and non-inflammable and the moulded construction avoids the necessity for framework which might obstruct the light.

These fittings are available in a wide selection of designs, ceiling and pendant, many of them similar to those made generally only in glassware. Bowl types are made up to 3 ft. in diameter, while spherical models are obtainable up to 18 in. in diameter. A gallery is not required for the ceiling models.

As the "Canvex" material used is made in standard colours of straw and peach as well as white, with attractively coloured bindings if required, the fittings are equally


Two examples of "Hilite" moulded fabric lighting fittings

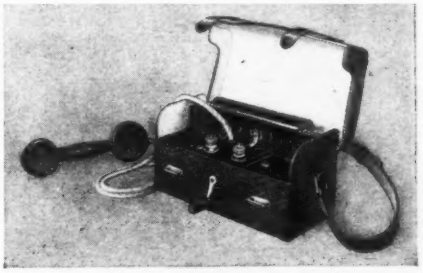
suitable for domestic use and for offices or industrial premises.

Light-weight Portable Telephone

Any item to be added to soldiers' equipment must necessarily weigh as little as possible, so that when the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, was approached to supply 5,000 field telephones for use by Chinese troops it had to work to the unusually low figure of 9 lb., which is 3½ lb. lighter than that of any foreign competitive specification.

The carrying case is made of black leather and its dimensions are 10½ in. by 6½ in. by 5½ in.; it has fastening straps and brass fittings and an adjustable carrying strap. The internal chassis is constructed from 16 SWG aluminium sheet with riveted joints.

The black bakelite hand combination receiver-transmitter includes a speaking key in the handle and is connected by a moulded rubber cord with overall textile braid. The hand generator incorporates a "Nial" magnet, and internal gears, its resistance being 500 ohms. An induction coil of the maximum side tone suppression type is provided; the two-gong bell having a resistance of 1,000 ohms is connected via a 2-mF condenser. The straightforward cir-


Chinese Army telephone set

cuit is suitable for use with any normal magneto switchboard, all the wiring being v.i.r. flexible with distinguishing colours. The battery consists of two small G.E.C. inert cells of standard pattern.

COMMERCIAL and INDUSTRIAL NEWS

October Exports. Christmas Holidays. Industrial Lighting Code

Overseas Trade in October

ALTHOUGH total exports from this country during October were smaller than in the corresponding month of last year, electrical goods and apparatus shipments showed a further increase. The value of this class was £706,420, as compared with £510,038 in October, 1939. The figure was £448,968 less than in October, 1938, which, however, was a good month. During the first ten months of the year exports were valued at £11,690,885, as compared with £9,371,609 in January-October, 1939, and £11,053,026 in the corresponding period of 1938. Exports of machinery (including electrical) during October were slightly higher than in October, 1939 (£2,122,577 against £2,057,805).

Imports of electrical goods and apparatus in October were valued at £139,639, as compared with £202,346 in October, 1939. For the first ten months of the year the total was £566,593 higher at £2,835,666.

I.M.E.A.'s Temporary Move

The headquarters of the Incorporated Municipal Electrical Association, as a temporary measure, have been transferred to Wigston Grange, Wigston, Leicester (telephone: Wigston 89508).

New Board of Trade Headquarters

The Board of Trade has moved its headquarters to Millbank, London, S.W.1. The telephone number and telegraphic address remain unchanged.

Import Licences for Returned Goods

As from December 2nd the concession will be withdrawn under which goods returned to this country in the same state as exported or after repair were by arrangement with H.M. Customs and Excise admitted without the necessity for the production of an import licence. Import licences will, therefore, in future be required for these goods.

Import Licensing Changes

The Board of Trade has issued a revised "Notice to Importers" (No. 106) showing the general import licensing position as at December 2nd. The Open General Licences have been revised, and in consequence, separate licences will henceforth be required for certain commodities which could hitherto be imported without them. Copies of the Notice can be obtained from the offices of any Collector of Customs and Excise, or from the Import Licensing Department, 25, Southampton Buildings (Furnival Street entrance), London, W.C.2.

Station Rating and Salaries

In to-day's circumstances many power stations are running for considerable periods beyond their economic continuous rating, and this has introduced a problem in relation to the salaries of the staffs. The matter is commented upon in the November *Electrical Power Engineer*, which mentions that at a recent meeting of the Negotiating Committee of the National Joint Board of Employers and Members of Staff (Electricity Supply Industry), the staff side submitted that the capacity of a certain Corporation's generating station should be based on maximum continuous rating for the purposes of classification in the Schedule and not on economic rating as was laid down in the award in the Clyde Valley case. It is stated that the case submitted was only one instance; it was not an isolated example.

The employers indicated their desire to consider the matter more fully before reaching a decision and it was decided to adjourn further discussion to enable them to obtain more data and give due consideration to the case presented by the Electrical Power Engineers' Association.

Code for Industrial Lighting

Investigations recently carried out in the Research Laboratories of the British Thomson-Houston Co., Ltd., indicate that eye strain can be minimised by employing adequate illumination provided by low-brightness sources approaching the colour of daylight, such as the "Mazda" 80-W tubular fluorescent lamp, carefully disposed relatively to the position of individual workers. Other causes of fatigue and depression can be avoided by controlling the level of brightness in the field of view.

As a result the following B.T.H. Code has been evolved which has as its object the achievement of industrial efficiency rather than of mere ft.-candle values:—1.—Regard the problem from the workers' point of view rather than that of the casual observer. 2.—Eliminate glitter from the work and glitter and dazzle from the local field of view. 3.—Provide adequate illumination. 4.—Eliminate dazzle or glitter from the general surroundings. 5.—Provide reasonable brightness of walls, ceilings or other surroundings. 6.—Take into account the purely psychological factors by promoting cheerful, comfortable and safe working conditions. 7.—Employ full engineering and designing skill to keep installation and maintenance costs at the lowest level consistent with the best lighting results.

Large low surface brightness artificial skylight employing "Mazda" 80-W tubular fluorescent lamps

Work at Christmas

The Ministry of Labour and National Service announces that the Government desires to give the following guidance to industry with regard to working arrangements at Christmas and the New Year:—The Government calls on all managements and workers engaged on war work to continue producing during the coming Christmas and New Year Season with not more than one day's break, either Christmas Day or New Year's Day. In the case of other establishments and services and, in particular, retail shops, it is not desired that there should be any departure from the arrangements which are customary at this time of year except to the extent that may be necessary for meeting the requirements of those continuing at work.

The rates and payments and other conditions for work done during what would ordinarily be a holiday period are in general prescribed by industrial agreements, and these should be observed. As announced by the Treasury, the Bank Holidays on Christmas Day in Scotland and Boxing Day in England and Wales and Northern Ireland will be cancelled but not so as to affect the provisions of industrial agreements relating to those days.

Christmas Arrangements

Our Advertisement Department asks us to say that advertisement copy and blocks for the December 27th issue should be received by December 11th. For the January 3rd issue the latest date is December 16th.

Training for War Production

The Ministry of Labour and National Service has announced that there is again an urgent need for recruits for the Ministry's various training schemes. These cover the Government training centres, technical colleges and arrangements with employers, sponsored by the Ministry, for the training of workers in excess of the employers' own needs. Since the Minister's appeal a few months ago there has been an excellent response, and the flow of recruits has, until recently, been more than sufficient to keep up with the development of the training capacity of the Government training centres. Recently, the numbers of volunteers have fallen off considerably and in addition large numbers, both of men and of women, will be required for the training arrangements at the technical colleges and in employers' own establishments.

The Ministry has recently reached an agreement with the Engineering Employers' Federation and the Amalgamated Engineering Union for the training of men and women, in the main newly recruited to the engineering industry, in employers' establishments, the training being given on actual production work. These arrangements will be made

with employers who, in addition to undertaking training for their own purposes, are also prepared to train men and women in excess of their needs for transfer to employment elsewhere as the national interest requires. Certain employers who are not fully engaged on production work have agreed to train men and women in their establishments, where the training is organised separately from production.

The employment and training of women is becoming of great importance. So far as training is concerned, women can be admitted to the courses in the technical colleges and in employers' establishments under the arrangements described above, and the Ministry would be prepared to train women in longer courses in the Government training centres.

While in training under any of the Ministry's arrangements, the standard training allowances are paid; these have recently been increased.

Engineers' Wage Claim

The claim of the Amalgamated Engineering Union for an advance of 3d. per hour in the wages of its members and the restoration of the working conditions existing prior to June, 1931, is to be submitted to the National Arbitration Tribunal. The decision was taken at a meeting of the National Council of the Union last week, when Mr. J. Tanner, the president, said that in rejecting the claim the employers did not attempt to deny that they were making big profits. They maintained, however, that the granting of the increase would not be in the country's interest. Mr. Tanner denied that the Union was trying to exploit the country in its own interests.

It was proposed in an amendment that negotiations should be reopened with the employers on the original basis with a suggestion that members should be prepared to withdraw their labour if the claim was not met. As the proposal to refer the matter to the National Arbitration Tribunal was carried by a large majority this amendment was not voted upon.

Factory Lighting in Wartime

The general problem of providing efficient lighting in factories has been complicated by the introduction of difficulties caused by the war in connection with such matters as black-out and danger from flying glass. These additional problems in existing factories have often demanded expensive solutions, and in some instances have necessitated modification of the normal lighting installations as well. Where new factories are concerned, however, the special wartime difficulties can be met in advance, and the only problem then is for the illumination engineer. Many new factories have recently been built to meet the demands of war production, and the methods of lighting adopted in one of these, devoted entirely to the manufacture of shell cases, are described below.

In this instance the question of protection against flying glass and that of providing efficient black-out arrangements do not arise as they have been dealt with simply by avoiding the use of all windows or roof glazing. The lighting system is therefore in operation for the whole twenty-four hours, and particular attention has been paid to obtaining the most efficient illumination by entirely artificial means. The lighting installation, including the wiring, has been carried out by Metropolitan-Vickers Electrical Co., Ltd., by the use of 144 mercury units in double rows along the bays. An important feature of the installation is the length of the two main bays, which measure about 480 ft. from end to end and 40 ft. in width. "Metrovick" standard mercury discharge lamps of 400-W and 250-W capacity have been used throughout, giving a surface illumination of 15 ft.-candles. A light-coloured paint has been used for the walls, and with a concrete floor and asbestos roofing the reflection factor obtained is a considerable advantage to the general illumination. The light falling on the machines is quite sufficient to obviate the necessity of local lighting except in one or two isolated cases.

Metrovick mercury-vapour lamps installed in a war factory

Electric Furnace Export Orders

Whilst every effort is being exerted to fulfil the enormous demand for heat-treatment plant at home, Wild-Barfield Electric Furnaces, Ltd., are by no means losing sight of the importance of export business. The Empire is by far the best customer and amongst plant which the company has in hand for Empire countries may be cited eight "Heavy-Hairpin" box type furnaces for South Africa and six similar furnaces for India. To India also are going a number of "Hairpin-Minor" furnaces and three special continuous bright annealing furnaces for non-ferrous strip and some special ovens with forced air circulation for low temperature treatment of non-ferrous parts. Australian orders include a continuous pan conveyor furnace for clean hardening. A recent shipment to Egypt included hardening and forced air circulating tempering furnaces, whilst a high-speed steel furnace is nearing completion for the same destination. Similar furnaces with separate "Hairpin-Minor" preheating equipments are in hand for China.

In addition large batches of small furnaces, solder bolt heaters and similar equipments are being despatched regularly overseas, many helping directly in production of war materials for which they are also indirectly helping to pay.

Purchase Tax on Damaged Goods

An announcement by the Board of Trade states that when goods are damaged or destroyed on the premises of a registered firm (but not a separate retail branch or department thereof) no liability to Purchase Tax will ordinarily arise on that account, if there has been no taxable sale or appropriation. The same applies where the damage or loss occurs while the goods are in transit to another registered firm which has bought them tax free as stock or materials, or to an export ship if they have been consigned abroad.

Furthermore, where a registered seller under the terms of his contract or guarantee allows credit or free replacement in favour of an independent person or firm (buying under a chargeable purchase) in respect of defective goods or goods not up to standard, or of goods damaged or lost in transit, a corresponding tax adjustment is allowable. No such adjustment is, however, permissible (*a*) where such goods have been appropriated by a registered wholesaler or manufacturer to a separate retail branch or department of his business, unless credit or free replacement is allowed to the registered wholesaler by the firm from which the goods were purchased; (*b*) where the goods have been sold to an independent retailer under terms which leave him responsible for the loss or damage; or (*c*) where the goods are taken back after use in part payment for another article. No abatement of tax is allowable in respect of goods lost or damaged after delivery, by a registered firm on the premises of a retailer or other non-registered person, whether by enemy action or otherwise.

It is further announced that tax is not chargeable on electrical condensers, loud speakers and wireless cabinets, but radio-gramophone cabinets are taxable.

Bethnal Green Wage Claim Rejected

The National Arbitration Tribunal has issued its award in the claim by the Electrical Trades Union against the Bethnal Green Borough Council.

The dispute arose out of a claim by the Union that the rates on which the war bonuses granted from time to time since the outbreak of war should be paid should be the schedule rates of the respective Joint Industrial Councils plus the discretionary addition of 10 per cent. which had been made by the Council up to November, 1939, but which had been merged or partly merged into standardised rates adopted by the Council at that date.

The parties were heard at a sitting of the Tribunal held in London on November 12th. Statements were made and documents submitted as to the number of workers affected, the rates of wages provided by the agreements of the Joint Industrial Councils for the Electricity Supply and Electrical Contracting Industries, the discretionary addition of 10 per cent. over and above these agreed rates which had been paid for some years by the Borough Council irrespective of service or merit, the war bonuses provided from time to time since the outbreak of war under the machinery of the Joint Industrial Councils, the conditions laid down with regard to the payment of these bonuses in the case of men in receipt of rates, either for service or merit, higher than the schedule agreed rates, and the adoption by the Borough Council in December, 1939, of a new wage agreement standardising the wages of its employees and absorbing therein any percentage additions hitherto paid by the Council, but so as not to reduce any worker's rate below the schedule rate plus war bonuses.

The Tribunal having given careful consideration to the statements and submissions of the parties, found against the claim and awarded accordingly.

Limitation of Supplies

The Limitation of Supplies (Miscellaneous) (No. 5) Order made by the Board of Trade (obtainable from the Stationery Office) supersedes the previous Miscellaneous Order as from December 1st. Existing restrictions are continued but, as previously announced, there is a complete prohibition on home trade supplies to unregistered persons of aluminium hollow-ware. Provision is made for the unrestricted supply of controlled goods (not including aluminium) to certain organisations engaged in essential services to enable them to replace goods destroyed by enemy action.

Factory Canteens

The Minister of Labour and National Service has made an Order under which, in cases where he finds its necessary to do so, the Chief Inspector of Factories, acting on the Minister's behalf, can give binding directions that the occupier of a factory engaged in work on behalf of the Crown and with more than 250 employees must provide a factory canteen. Copies of the Order (S.R. & O. 1940 No. 1993), which is called the Factories (Canteens) Order, 1940, may be purchased (price 1d.) direct from the Stationery Office or through any bookseller.

Fatality

The *News-Chronicle* reports an unusual fatality. A London tobacconist whose shop had been broken into several times connected up the bars beneath a skylight to an electric circuit. A detective found a man lying dead across the skylight having apparently received a fatal shock. The tobacconist said that he had previously tested the bars and received only a slight shock, but an electrical surveyor said that the fact that there had been heavy rain rendered the arrangement dangerous. At an inquest a verdict of "Death by misadventure" was returned.

American Refrigerator Sales

Sales of electric household refrigerators by United States manufacturers in September continued to run far ahead of the corresponding month last year. Unit sales during the month were 113,846 against 81,473 in September, 1939, and 202,209 in August this year. This was the thirteenth successive month to show sales above those for the corresponding month of the previous year. Sales for the nine months also reached a new high record at 2,387,215 units, as compared with 1,759,387 for January–September last year and the former record of 2,116,612 for the first nine months of 1937. According to *Reuter's Trade Service* the establishment of new records for refrigerator sales has been due to the domestic market, foreign sales having steadily fallen off in recent years.

Protection of Glass in Factories

The Minister of Labour and National Service has made an Order requiring occupiers of factories in which more than 250 persons are employed to provide and maintain safeguards (by way of fencing, the use of alternative materials or otherwise) to afford protection for the employees against risk from injury caused by broken glass from windows, skylights and internal partitions. The Order provides that the occupier is to have regard to any circulars which may from time to time be issued by the Minister for the guidance of occupiers of factories to which the Order applies. Such a circular dated November 21st has been issued. Copies of the Order, which is called the Factories (Glass Protection) Order, 1940 (S. R. and O. 1940 No. 2013), and of the circular can be purchased, price 1d. each, through any bookseller or direct from H.M. Stationery Office.

A factory occupier can apply to the Ministry for exemption from the Order on the ground that the persons employed in the factory are not employed in services essential for the defence of the realm or the efficient prosecution of the war or essential to the life of the community.

American Electrical Orders

The United States National Electrical Manufacturers' Association announces that there was a further fall in August in the orders received for motors and generators and transmission and distribution equipment. As compared with last year's volume, however, both classes showed a very substantial increase.

United States Exports

Figures just to hand show that the value of the electrical machinery and allied material exported from the United States during the first eight months of the current year attained a value of $93,612,408, an increase of over 27 per cent. as compared with the shipments in the corresponding period of 1939.

A.S.E.E. Meeting Alteration

The Association of Supervising Electrical Engineers announces that the meeting arranged for December 17th at the Lighting Service Bureau is now to take place on December 14th at Aldwych House, W.C.2. Mr. R. Grierson will give a talk on "Facts and Fallacies in Relation to Electric Space Heating Installations."

Rubber Mat Specification

The British Standard Specification for rubber mats for electrical purposes (B.S. 921) just issued by the British Standards Institution is not intended to imply that such mats should afford the sole means of protection. Wherever possible further precautions should be taken against the risk of shock and short-circuit. In this connection attention has been drawn to the fact that, in places in which the Home Office Electricity Regulations apply, it may be illegal in certain cases for work to be done on live conductors or apparatus in excess of medium pressure (650 V) as for instance in Home Office Electricity Regulations 18 (*d*).

The specification covers the scope, construction, thickness and weight and the workmanship and finish. Electrical, mechanical and ageing tests have also been included. Copies may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d. post free.

Food Machinery Export Group

The Food Machinery Export Group has been officially recognised by the Export Council as the Food Preparation Machinery (Miscellaneous) Export Group to represent the makers of British equipment for the manufacture, preservation, handling, storage and preparation of every type of edible products. The group has now been in existence for six months and its service in issuing licences for raw materials for the export trade is functioning smoothly.

The Ministry of Supply, recognising the importance of the food industry and the valuable nature of the products manufactured by its members in relation to the export market, allocates generous supplies of certain raw materials. These supplies are administered and certificates issued by the group. The working committee consists of Messrs. F. C. Gardner (chairman), A. J. Clare, L. A. Moody, R. G. Radley, and L. H. Tonkin.

The list of members includes a number of makers and users of electrical equipment. The secretary is Mr. W. L. Hill, 17, Stratford Place, London, W.1 (telephone: Mayfair 7383).

Standard Domestic Refrigerators

The publication recently of B.S.S. 922 is the result of representations made two years ago by a group of engineers interested in the development of the domestic electric refrigerator, and is based largely on the specification prepared by the American National Electrical Manufacturers' Association, the national test code issued by the Standards Association of Australia, and the provisions of the electrical code issued by the Canadian Engineering Standards Association. It comprises methods of computation of cabinet volume and food-storage surface area, certain constructional details, clauses covering the rating of the motor, requirements for the electric circuits and a section on testing. Copies can be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d. post free.

Trade Announcement

Coventry Factors, Ltd., have removed to temporary premises at 152, Woodside Avenue, Coventry (telephone: Coventry 61051/2) and request wireless and electrical suppliers to write them at this address with a view to delivery of goods outstanding, and the supply of statements and copy invoices.

Mek-Elek Engineering Ltd., has given up its premises at 16, Douglas Street, London, S.W.1, and all communications should be sent to 17, Western Road, Mitcham, Surrey.

Macrome, Ltd., has removed to Alcester, Warwickshire.

Bakelite, Ltd., asks that no goods shall be delivered until suppliers are notified that it is convenient to receive them. Urgent queries will be dealt with by telephone (Lapworth (Birmingham) 231). Other matters concerning purchases, accounts, etc., should be addressed to Brackley Lodge, Brackley, Northants.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

TRE VITA gas lighter elements (Wartburg Lamps, Ltd., address).

TRADE MARK APPLICATION

AMONG recent applications for British trade marks is the following, objection against which may be entered within one month of November 27th :—

Stripular. No. 613,167. Class 11 (IV). Electric heating apparatus. The Hotpoint Electric Appliance Co., Ltd., 24, Newman Street, London, W.1.

BRITISH WEST INDIES IMPORTS

Future Promise of Expansion

THE agreement between the British and United States Governments for the establishment of naval and air bases in various parts of the British West Indies makes opportune an examination of the potential market for British goods in this part of the Empire. It is fair to assume that business in many branches of importation will be stimulated in the centres where these bases are to be set up, namely Jamaica, British Guiana, Bahamas, St. Lucia, Antigua, Bermuda and probably Trinidad.

Another reason why the British exporter should try to strengthen his foothold in the British West Indies is the adoption by the Home Government of the recommendations of the Moyne Commission. When State financial conditions permit these to be carried out fully, industry, housing and welfare generally should be greatly stimulated.

As purchasers of United Kingdom goods the islands of the British West Indies have varied fairly widely in importance. The governing factors have been population, and particularly the proportion of whites, stability of the market for leading commodities and, of course, the value of the principal products. That the last-named factor may overrule that of population is shown in respect of Jamaica and Trinidad. The population of the former is over 1,120,000. Jamaica's exports have been more diverse in character and greater in volume and value than those of the other Colonies. But the total value of her imports from Great Britain at about £2,000,000 in recent years, was £250,000 less than those of Trinidad, whose population (with that of Tobago) is 465,000 or little more than a third of Jamaica's. Trinidad's resources and purchasing power are enriched by more than one product which is absent from the other islands. Annual values of Trinidad's exports of petroleum have exceeded £3,000,000 and of asphalt products £200,000. In addition there are shipped considerable quantities of cocoa, sugar, copra, etc.

Next in importance to Jamaica and Trinidad as buyers of British goods come British Guiana and Barbados, with populations of about 300,000 and 180,000, and imports from Great Britain valued at £1,100,000 and £850,000 respectively. Specialities, so far as the West Indies are concerned, among British Guiana's exports (which have totalled nearly £2,500,000 in a good year) are gold, bauxite and diamonds. Sugar is the leading export, together with rum, rice and timber. The staple surplus products of Barbados are sugar and molasses.

The Customs tariffs of the islands provide in most cases for preferential duties on British supplies; in some of the islands electrical goods are admitted free of duty.

In the latest report on the British West Indies by the resident British Trade Commissioners it was stated that great use was being made of electricity in Bermuda, notably in domestic refrigeration and water heating. In Trinidad the use of electricity for domestic purposes other than lighting was slow to be adopted. But offsetting that hindrance to the electrical salesman, house building has been active in the districts which benefit from the petroleum industry.

The accompanying tables show the range of electrical imports in the different markets and the countries (mainly the United Kingdom and the United States) participating in the trade. Values are for 1939 in either £ or dollars, according to the currency of the territory, with a note of increases or decreases compared with 1938.

JAMAICA

	1939 £	Inc. or dec. on 1938 £
Generators—		
Total	61,900	+47,000
From Great Britain	5,500	− 2,600
„ Canada	10,900	+ 9,800
„ United States	45,400	+40,400
Radio apparatus—		
Total	17,500	+ 300
From Great Britain	1,100	− 500
„ Holland	3,400	+ 1,400
„ United States	12,400	− 600
Ditto, parts—		
Total	3,400	+ 1,200
Telegraph and telephone material—		
Total	21,700	+ 9,400
From Great Britain	16,600	+ 8,100
„ Canada	1,000	+ 500
„ United States	4,000	+ 800
X-ray apparatus and films—		
Total	6,600	+ 4,400
From Great Britain	5,000	+ 4,300
„ United States	1,000	+ 640
Other electrical apparatus—		
Total	48,600	− 5,800
From Great Britain	8,700	− 8,400
„ Canada	800	+ 30
„ United States	37,500	+ 2,900
Electric lighting and power plant—		
Total	3,100	− 1,800
From Great Britain	1,900	− 900
„ United States	1,200	− 1,000

TRINIDAD & TOBAGO

	1939 £	Inc. or dec. on 1938 £
Wires and cables, insulated—		
Total	214,000	+58,000
From Great Britain	192,500	+51,500
„ United States	12,800	+ 2,800
Radio telegraph and telephone apparatus—		
Total	88,300	+23,600
From Great Britain	23,800	+ 4,300
„ Holland	7,300	+ 4,100
„ United States	55,700	+14,400
Other telegraph and telephone apparatus—		
Total	31,100	−18,900
From Great Britain	20,800	−16,400
„ Canada	4,500	+ 1,000
„ United States	4,800	+ 300
Electric lamps, under 20 V.—		
Total	5,700	+ 400
From Great Britain	900	− 400
„ United States	3,900	+ 900
Ditto, 20 V and over—		
Total	22,300	−10,100
From Great Britain	14,400	−12,600
„ United States	7,600	+ 3,200
Other lighting appliances and fittings n.e.s.—		
Total	31,100	− 3,200
From Great Britain	13,800	− 2,800
„ Germany	5,000	− 1,400
„ United States	9,300	+ 2,900
Batteries, primary, complete—		
Total	27,600	+ 700
From Great Britain	2,300	− 1,800
„ Canada	1,500	+ 200
„ United States	23,700	+ 2,700
Accumulators and parts—		
Total	25,200	+ 3,600
From Great Britain	2,600	− 400
„ Canada	14,700	+ 1,800
„ United States	7,900	+ 2,200
Electric stoves—		
Total	4,300	‡
From Great Britain	2,700	‡
„ United States	1,600	‡
Other domestic cooking and heating appliances—		
Total	8,200	‡
From Great Britain	4,600	‡
„ United States	3,300	‡
Electrical goods and apparatus n.e.s.—		
Total	323,000	+74,000
From Great Britain	226,700	‡
„ Canada	16,500	‡
„ United States	74,500	‡
Electrical machinery—		
Total	258,000	+10,000
From Great Britain	189,000	+52,000
„ Canada	10,000	+ 8,000
„ France	6,400	− 100
„ United States	50,200	−50,900
Electric refrigerators, water and beverage coolers and parts—		
Total	39,000	‡
From United States	38,000	‡
Other electrical appliances and parts—		
Total	5,000	‡
From Great Britain	900	‡
„ United States	2,300	‡

‡ Comparative figures not available.

BRITISH GUIANA

	1939 $	Inc. or dec. on 1938 $
Electro-medical apparatus—*		
Total	1,500	+ 200
Wires and cables—		
Total	14,300	− 2,700
From United Kingdom	6,200	− 4,000
„ United States	6,700	+ 2,100
Cooking and heating apparatus—		
Total	4,100	− 1,100
From United Kingdom	780	− 320
„ United States	2,900	—
Radio apparatus—		
Total	41,000	+ 2,300
From United Kingdom	1,700	− 100
„ Holland	15,700	+ 1,000
„ United States	23,500	+ 1,800
Radio parts—		
Total	10,000	+ 3,000
From United Kingdom	400	− 400
„ Holland	1,100	+ 700
„ United States	7,900	+ 2,400
Other electrical goods and apparatus—		
Total	85,500	− 1,600
From United Kingdom	18,600	−10,200
„ Canada	7,200	+ 2,200
„ Japan	1,700	—
„ United States	56,700	+ 6,700
Electrical machinery—		
Total	32,000	−53,000
From United Kingdom	13,100	−26,900
„ United States	15,500	−23,000
„ Canada	2,900	− 3,800

* Mainly from U.K.

BRITISH HONDURAS

	1939 $	Inc. or dec. on 1938 $
Radio sets and parts—		
Total	10,900	− 2,700
From Holland	2,500	− 1,500
„ United States	8,400	− 1,100
Other electrical apparatus—		
Total	37,000	+12,000
From United Kingdom	2,200	+ 500
„ United States	34,300	+12,200
Electric lighting machinery—		
Total	12,000	− 6,000
From United Kingdom	3,000	− 7,600
„ United States	8,500	+ 1,500

BARBADOS

	1938–39 £	Inc. or dec. on 1938 £
Radio apparatus—		
Total	4,300	+ 2,200
From United States	1,700	+ 100
„ Holland	2,400	+ 2,150
Radio parts—		
Total	1,200	− 1,200
From United States	700	+ 500
„ Holland	500	+ 460
Other electrical appliances—		
Total	30,600	−17,700
From United Kingdom	22,300	−19,000
„ United States	6,600	+ 1,000

BERMUDA

	1939 £	Inc. or dec. on 1938 £
Electrical supplies—		
Total	94,800	+ 5,800
From United Kingdom	9,600	−16,400
„ Canada	6,400	− 1,900
„ United States	77,600	+23,800
Radio sets and parts—		
Total	6,800	+ 1,000
From United Kingdom	2,200	+ 1,600
„ United States	4,600	− 200

Imports of electrical apparatus and appliances into the Bahamas in 1939 totalled £25,000 in value, only £1,340 of which represented British goods.

ELECTRICITY SUPPLY

Newcastle (Staffs), Paisley and Sutton Coldfield Reports
Mutual Aid in Yorkshire

Bedford. — The Corporation Electricity Committee is to lay an 11,000-V underground cable in the parishes of Clapham and Oakley at a cost of £7,817.

Cannock.—BULK SUPPLY CHANGE.—Important changes in the bulk supply of electricity to Cannock are foreshadowed by the Urban Council's acceptance of a technical scheme whereby, in the near future, energy will be received direct from the West Midlands Joint Electricity Authority instead of from the Wolverhampton Corporation.

Chigwell. — SHELTER LIGHTING. — The Essex County Council Emergency Committee is to provide electric lighting in fourteen shelters in the Chigwell area at a cost of £735.

Darlington. — STREET LIGHTING. — The Town Council is considering the provision of street lighting at High Northgate, Russell Street and on the Polam Hill Estate.

Dundee. — SHELTER LIGHTING. — The Council is to spend £100,000 on improving air raid shelters and it is expected that £22,500 of this will be allocated to electric lighting. A deputation from the Corporation to the Ministry of Home Security had a favourable reception. While the question of electric lighting has been left over for consideration, the deputation has no doubt that approval will be forthcoming soon.

Glasgow.—HEATING OF CORPORATION HOUSES.—The Corporation Housing Committee is to receive a deputation from the Tenants' Association on the question of installing electric plugs in all rooms of Corporation houses which are not provided with coal fires.

Hungerford. — STREET LIGHTING. — The Parish Council has decided to accept an offer from the Wessex Electricity Co. to install a few lights for demonstration purposes before deciding whether to adopt the modified form of street lighting.

Llanrwst. — ALTERNATIVE SUPPLY.—The Urban Council has decided to make representations to the Electricity Commissioners for an alternative source of electricity supply to the area. Bettwsycoed Urban Council is to be asked to support the Council in its views.

London.—ISLINGTON.—A sum of £2,428 has been allocated by the Borough Council from the £4,275 surplus of the electricity undertaking towards the relief of the rates.

Newcastle-under-Lyme.—LOSS ON WORKING.—Mr. A. J. C. DeRenzi, borough electrical engineer, in his report on the Corporation Electricity Department for the financial year ended March last, stated that the net deficit amounted to £1,498 compared with a net profit of £2,032 in the previous year, it being the first occasion for twenty years that the Department had recorded a deficit. Capital expenditure had been incurred on a new showroom and demonstration room, additional office accommodation, and new garages, stores and meter testing department. He recommended that the existing tariffs should remain unaltered until the end of the present year.

Oldham. — APPLIANCE SALES. — It was stated at a recent meeting of the Electricity Committee that the actual sales of electrical appliances were lower but the work was possibly greater because all the cookers were renovated ones. No new ones had been sold since the war started.

Paisley.—REPORT FOR 1939-40.—In its report for the year ended May 15th last, the Electricity Supply Committee shows a gross revenue of £271,929 and expenditure of £213,633, leaving a net revenue of £58,296. After meeting capital charges, tax, etc., there was a net surplus of £68 which was added to the balance of £48,325 at credit of reserve fund, making £48,393. The sales of energy totalled 63,468,848 kWh, of which power accounted for 43,110,090 kWh and the "all-in" domestic consumers for 8,668,621 kWh. The maximum demand was 25,295 kW and the number of consumers 23,418.

In sending us the report the engineer and manager (Mr. D. Ross) mentions that an increase of about 10 per cent. in charges took effect in the last quarter of the year. The revenue from public lighting was only £14,812 against an estimated figure of £21,750, but the Public Lighting Committee has agreed to bear the capital charges on street lighting cables and equipment for the period during which lighting restrictions remain in force.

Salford.—STREET LIGHTING.—The Light, Heat and Power Committee has asked the city electrical engineer (Mr. L. Romero), the city gas engineer (Mr. F. H. Goodwin) and the lighting superintendent (Mr. H. S. Whitehead) to prepare a joint report on a scheme of modified lighting for roads which can be quickly put into operation.

WARNING TO CONSUMERS.—The Electricity Department has issued to consumers the following warning about electrical services in air raid shelters:—Don't use flexible for lights; don't use lampholders which are not shockproof; don't connect electric fires to lampholders.

South Yorkshire.—MUTUAL AID GROUP.—Mr. G. R. Laithwaite, the Worksop borough electrical engineer, in a report to the Council, states that he recently attended a conference at Mexborough, of representatives of electricity undertakings in the neighbouring districts at which was discussed the formation of a group of electricity undertakings organised to aid each other in case of damage due to enemy action. It was agreed to inaugurate such a scheme and to entitle the group the South Yorkshire Mutual Aid Group. The proposals would be subject to the approval of the individual committees concerned. In the event of an undertaking supplying material to another, expenses incurred by technical staffs would be added to the account, plus 10 per cent. for establishment charges. Mr. Laithwaite mentioned that the insurance companies concerned would most likely be prepared to cover risks to employees and property lent to another undertaking without payment of additional premiums.

Stone (Staffs).—PRICE INCREASE.—The Urban District Council has decided, in order to meet the increased costs of the undertaking, that an increase of 15 per cent. shall be made in charges for electrical energy, to include standing charges, to operate from January 1st 1941, and to take the place of the last increase of 12½ per cent. on units sold.

PROTEST TO COMMISSIONERS.—The Council has also decided to lodge an objection with the Electricity Commissioners and the North West Midlands Joint Electricity Authority against the proposal of the J.E.A. to apply for authorisation to acquire a portion of the Council's overhead lines and apparatus in the rural district.

Surrey.—SHELTER LIGHTING.—The Education Committee is to install electric lighting and ventilation at school shelters at a cost of £36,550. The Public Assistance Committee is also to provide lighting and ventilation at institution shelters costing £387.

Sutton Coldfield.—ANNUAL REPORT.—A reduction of £1,313 in the surplus (to £3,023) is recorded by Mr. Thomas Bloore, the borough electrical engineer and manager, in his report for 1939-40. The total income on revenue account was £85,305 (a decrease of £760) but expenditure at £56,073 was £3,130 higher. There was an adverse balance of £199 in the sales and development department's accounts. Hire and hire-purchase schemes were suspended shortly after the outbreak of war on account of the then impending Fuel Rationing Order, depletion of staff and difficulties in obtaining material. The sales of energy rose by 450,939 kWh to 15,292,104 kWh.

RADIO AND TELEPHONY

Cardiff.—FIRE BRIGADE RADIO.—Cardiff claims to be the first town in this country to utilise two-way wireless communication between fire engines and brigade headquarters. Mr. J. A. Wilson, chief constable, recently told the Watch Committee that delivery was awaited of a new engine with radio equipment installed in the driver's cab.

Darlington.—RADIO RELAY SYSTEM.—The Town Council has entered into a new agreement with Northern Rediffusion Services, Ltd., regarding the wireless relay service in the borough.

Great Britain.—POST OFFICE SYSTEM.—The wire mileages of trunk telephone and telegraph lines, including spares, owned and maintained by the Post Office in the British Isles total 96,110 miles overhead and 4,236,159 miles underground. The respective mileages of wholly junction wire are 191,415 and 2,490,463 while subscribers' wire mileage is 1,248,325 compared with 8,557,112.

Sunderland.—POLICE WIRELESS.—The Corporation Watch Committee is to spend £2,000 on the installation of wireless telegraphy for the police and fire brigade. A grant of 50 per cent. is expected from the Government.

United States.—FREQUENCY MODULATION.—For two-way communication in emergencies ten service cars and trucks belonging to the Indianapolis Power & Light Co. are being fitted with 25-W transmitters and receivers to enable them to keep in touch with headquarters, where 250-W equipment is being provided. The instruments are of the American General Electric Co.'s manufacture and frequency modulation has been adopted because of its greater freedom from interference and capability of operating over twice the distance that would be possible with the employment of amplitude modulation of equal power.

The first community in the Chicago area to adopt frequency modulation for two-way communication in emergencies is the City of Maywood (III) where the police headquarters have been provided with 25-W equipment of "G.E." make to keep in touch with patrol cars. To cover the same service area with amplitude modulation would need at least 250 W.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parenthesis. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

6030. "Light modulating devices for use in television receivers." I. M. K. Syndicate, Ltd., P. Nagy and M. J. Goddard. February 23rd, 1939. (Cognate application, 12162/39.) (528734.)

6685. "Measuring methods and apparatus." Bailey Meters and Controls, Ltd. March 1st, 1938. (528735.)

6829. "Insulated electric conductors." Solution Trust, Ltd. March 2nd, 1938. (528677.)

6830. "Insulated electric conductors." Solution Trust, Ltd. February 16th, 1939. (528678.)

7011. "Means for determining the rate of change of current in a DC electric circuit." English Electric Co., Ltd., A. S. Fenemore and N. H. Shaw. March 3rd, 1939. (528789.)

7455. "Radio apparatus and the like." L. L. de Kramolin. March 7th, 1939. (528736.)

8743. "Magneto." J. Bohli. April 1st, 1938. (528679.)

10112. "Electric selective signal responsive devices." Standard Telephones & Cables, Ltd., and E. A. H. Bowsher. March 31st, 1939. (528790.)

10399. "Electric immersion heaters." Best Products, Ltd., and F. L. Best. April 3rd, 1939. (528682.)

11923. "Electric remote control systems." Westinghouse Brake & Signal Co., Ltd. August 5th, 1938. (528745.)

12976. "Cathode ray tube television receivers and optical projection systems therefor." Scophony, Ltd., and F. Okolicsanyi. May 1st, 1939. (528685.)

13057. "Electric remote control systems." Westinghouse Brake & Signal Co., Ltd. August 3rd, 1938. (528747.)

13069. "Air-blast circuit breakers for high rated currents." Akt.-Ges. Brown, Boveri & Cie. May 6th, 1938. (528906.)

13103. "Safety devices for machine tools." Standard Telephones & Cables, Ltd., F. W. May and G. W. Clarke. May 2nd, 1939. (528687.)

13104. "Intervalve coupling-circuits." Standard Telephones & Cables, Ltd., and D. N. Corfield. May 2nd, 1939. (528688.)

13105. "High frequency amplifiers." Kolster-Brandes, Ltd., and C. N. Smyth. May 2nd, 1939. (528689.)

13106. "Electrical signal storage equipment." Standard Telephones & Cables, Ltd., G. C. Hartley and G. D. H. Griffith. May 2nd, 1939. (528690.)

13199. "Magnetos." J. Bohli. December 13th, 1938. (528753.)

13221. "Electric transformers." British Thomson-Houston Co., Ltd. May 4th, 1938. (528793.)

13223. "Calculating devices for direction finders." Standard Telephones & Cables, Ltd. June 2nd, 1938. (528794.)

13233. "Electrical resistances." F. W. B. Hambling and J. B. Pearman. May 3rd, 1939. (528795.)

13266. "Light polarising devices." International Polaroid Corporation. May 11th, 1938. (Cognate application, 13267/39.) (528796.)

13317. "Insulated electric conductors." Soc. Alsacienne de Constructions Mécaniques. May 4th, 1938. (Cognate application, 13318/39.) (528755.)

13328. "Electrical resistances." H. P. Huhne. May 4th, 1939. (528757.)

13396. "Electrodeposition of copper." E. I. du Pont de Nemours & Co. May 4th, 1938. (528762.)

13399. "Apparatus for the galvanoplastic multiplication of sound-record bands." K. Daniel. May 6th, 1938. (528764.)

13428. "Portable X-ray equipment." Portable X-Rays, Ltd., and J. C. Wilson. May 5th, 1939. (528798.)

13462. "Electrical regulators." J. Stone & Co., Ltd., and L. R. Nixon. May 5th, 1939. (528800.)

13493. "Cathode-ray tubes and deflection systems therefor." Standard Telephones & Cables, Ltd., and R. A. L. Cole. May 5th, 1939. (528801.)

13518. "Thermionic valve circuits such as multi-vibrators and the like." R. Calvert. May 5th, 1939. (528806.)

13575. "Ignition magnetos." J. Lucas, Ltd., and E. A. Watson. May 6th, 1939. (528854.)

13576. "Portable electric lamps." J. Lucas, Ltd., and H. V. Simco. May 6th, 1939. (528912.)

13614. "Electric furnaces." F. B. Dehn. (Lindberg Engineering Co.). May 6th, 1939. (528857.)

13659. "Suction cleaners." Hoover, Ltd. May 9th, 1938. (528913.)

13698. "Tuning of wireless receivers." Telefunken Ges. für Drahtlose Telegraphie. May 6th, 1938. (528916.)

13706. "Thermionic valve circuits." General Electric Co., Ltd., H. C. Turner and G. M. Tomlin. (528860.)

13742. "Fuseheads suitable for use in electric blasting detonators and electric fuses, and for similar purposes." L. K. Ingram and Imperial Chemical Industries, Ltd. May 8th, 1939. (528918.)

14227. "Methods of and apparatus for sensing radiant energy." Standard Telephones & Cables, Ltd. May 18th, 1938. (528697.)

14239. "Ultra-short-wave course beacons." Standard Telephones & Cables, Ltd. June 11th, 1938. (528861.)

14241. "Arrangements for mounting radio direction finding equipment on vehicles." Standard Telephones & Cables, Ltd. May 28th, 1938. (528700.)

14249. "Photometers." A. Hilger, Ltd., F. Twyman, G. F. D. Lothian and L. J. Spencer. May 12th, 1939. (528701.)

14253. "Electric arc lamps." British Thomson-Houston Co., Ltd. May 14th, 1938. (528702.)

14284. "Electrical wiring systems." F. V. Wickham, O. A. Koll and Key Engineering Co., Ltd. May 12th, 1939. (528708.)

14325. "Process and apparatus for continuous impregnation of cables and the like articles." W. J. Fraser & Co., Ltd., Callender's Cable & Construction Co., Ltd., F. Peel and R. S. Vincent. May 13th, 1939. (Addition to 514,374.) (528715.)

14334. "Electric distribution apparatus." J. M. Hollander. May 13th, 1939. (528717.)

14336. "Method of manufacturing electric heating elements." W. Schoeni. May 16th, 1938. (528718.)

14356. "Method of and apparatus for measuring electrical quantities." Elliott Bros. (London), Ltd., G. F. Shotter and H. D. Hawkes. May 13th, 1939. (528722.)

14383. "Gas- or vapour-filled electric discharge devices." Patentverwertungs-Ges. Hermes. May 14th, 1938. (528725.)

14401. "Mechanical connectors of the cone-grip type for overhead electrical conductors." G. Blount. May 15th, 1939. (528772.)

14434. "Vacuum cleaners." A. H. Lee. May 15th, 1939. (528778.)

14478. "Electric discharge lamps comprising luminescent materials." General Electric Co., Ltd., H. G. Jenkins and A. H. McKeag. May 15th, 1939. (528811.)

14481. "Mercury-arc convertors." General Electric Co., Ltd., D. H. Donaldson and H. T. Ramsay. May 15th, 1939. (Addition to 515175.) (528812.)

14482. "Clips for electric fuses of the cartridge type." General Electric Co., Ltd., G. J. H. Bignell and A. F. Searle. May 15th 1939. (528813.)

14483. "Valves." British Thomson-Houston Co., Ltd. May 17th, 1938. (528814.)

14484. "Apparatus for the electrostatic deposition of particles suspended in gases." English Electric Co., Ltd., and W. Donnelly. May 15th, 1939. (528815.)

14501. "Radio antenna." Marconi's Wireless Telegraph Co., Ltd. May 18th, 1938. (528817.)

14502. "Electron multipliers." Marconi's Wireless Telegraph Co., Ltd. June 10th, 1938. (528818.)

14503. "Secret communication systems." Marconi's Wireless Telegraph Co., Ltd. June 21st, 1938. (528819.)

14504. "Grid structures for electron-discharge tubes." Telefunken Ges. für Drahtlose Telegraphie. May 14th, 1938. (528820.)

14505. "Impedance transformer arrangements." Telefunken Ges. für Drahtlose Telegraphie. June 14th, 1938. (528821.)

14518. "Train-actuated electric track contact devices." L. Gombos and L. Aszalos. May 15th, 1939. (528863.)

14523. "Electrical connecting device." Bendix Aviation Corporation. May 16th, 1938. (528824.)

14539. "Luminescent materials." L. A. Levy and D. W. West. May 16th, 1939. (528828.)

14553. "Induction type electricity integrating meters." Ferranti, Ltd., J. Prince and M. Whitehead. May 16th, 1939. (528830.)

14599. "Combinations of sources of radiation with luminescent materials." General Electric Co., Ltd., H. G. Jenkins and J. W. Ryde. May 16th, 1939. (528873.)

14603. "Radio beacons for guiding craft." Standard Telephones & Cables, Ltd. May 25th, 1938. (528874.)

14611. "Electric motors." British Thomson-Houston Co., Ltd., and B. Adkins. May 16th, 1939. (528878.)

14612. "Cabinets for refrigerators and the like." British Thomson-Houston Co., Ltd. May 17th, 1938. (528879.)

14613. "Electric choke coils." British Thomson-Houston Co., Ltd. May 17th, 1938. (528880.)

14614. "Electric motor control systems." British Thomson-Houston Co., Ltd. May 18th, 1938. (528881.)

14615. "Method of manufacturing manganese dioxide." British Thomson-Houston Co., Ltd. (Tokyo Electric Co., Ltd.). May 16th, 1939. (528882.)

14647. "Circuits for the amplification and/or frequency changing of electric

(*Concluded on page* 118)

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares

New Companies Registered

Bowen Instrument Co., Ltd.—Private company. Registered November 21st. Capital £2,000. Objects: To acquire the business of scientific instrument makers formerly carried on by Wm. Bowen at 9, Newton Road, Leeds, 7, as the Bowen Instrument Co., and to carry on the business of electrical, mechanical and metallurgical engineers, manufacturers of and dealers in chemical, electrical, thermal and other instruments, etc. Wm. Bowen, 456, Harrogate Road, Leeds, 7, is permanent governing director. Registered office: 9, Newton Road, Leeds.

F. R. Skeels (Electrical Engineers), Ltd.—Private company. Registered November 21st. Capital £500. Objects: To carry on the business of electrical, radio, automobile, mechanical and general engineers, electricians, etc. The directors are: F. R. Skeels, and Dora M. Skeels, both of 91, Dover Road, E.12. Secretary: W. N. Betts. Registered office: 138, Rush Green Road, Romford, Essex.

Monnier (Electrical), Ltd.—Private company. Registered November 21st. Capital £100. Objects: To carry on the business of electrical, wireless, mechanical and general engineers, etc. The directors are: Lilian I. Monnier, 53, Ravensbury Road, S.W.18, and Vera Lambert, 38, Devereux Road, S.W.11. Registered office: 34, London Wall, E.C.2.

Auto Electric & Engineering Co., Ltd.—Private company. Registered November 21st. Capital £1,000. Objects: To carry on the business of a motorists' electrical service station, electrical, motor and mechanical engineers, etc. A. MacLachlan, 174, Newhampton Road West, Wolverhampton, is permanent director.

Companies' Returns

Statements of Capital

Ever Ready Co. (Great Britain), Ltd.—Capital £1,500,000 in £200,000 7 per cent. cumulative participating preference, £1,010,402 5s. ordinary stock and 1,158,391 ordinary shares of 5s. Return dated June 17th, 1940. All stock taken up. £579,958 5s. paid on £98,000 preference stock and £481,958 5s. ordinary stock. £630,444 considered as paid on £102,000 preference stock and £528,444 ordinary stock. Mortgages and charges: Nil.

Anchor Cable Co., Ltd.—Capital £250,000 in £10 shares. Return dated June 28th, 1940. 21,334 shares taken up, £79,340 paid. £134,000 considered as paid. Mortgages and charges: Nil.

National Electric Construction Co., Ltd.—Capital £185,000 in 370,000 shares of 10s. each. Return dated July 1st, 1940. All shares taken up. £175,574 10s. paid. £9,425 10s. considered as paid. Mortgages and charges: Nil.

Siemens Bros. & Co., Ltd.—Capital £3,000,000 in £550,000 10 per cent. cumulative preference stock and £2,450,000 ordinary stock. Return dated June 18th 1940. All stock taken up, £3,000,000 paid. Mortgages and charges: Nil.

Northwood Electric Light & Power Co., Ltd.—Capital £290,000 in 6,880 cumulative preference and 283,120 ordinary shares of £1. Return dated July 4th, 1940. 6,880 preference and 279,680 ordinary shares taken up. £215,775 paid on 6,880 preference and 208,895 ordinary shares. £70,785 considered as paid on 70,785 ordinary shares. Mortgages and charges: Nil.

Para Electric Railways & Lighting Co., Ltd.—Capital £780,000 in 390,000 preference and 390,000 ordinary shares of £1. Return dated July 8th, 1940. 325,000 preference and 390,000 ordinary shares taken up. £25,040 paid on 25,000 preference and 40 ordinary shares. £689,960 considered as paid on 300,000 preference and 389,960 ordinary shares. Mortgages and charges: £526,714.

Electric Service Company (Birmingham), Ltd.—Capital £2,500 in £1 shares. Return dated July 10th, 1940. All shares taken up. £1,250 paid. £1,250 considered as paid. Mortgages and charges: Nil.

South African Lighting Association, Ltd.—Capital £100,000 in £10 shares. Return dated July 11th, 1940. 9,000 shares taken up. £88,950 paid on 8,895 shares. £1,050 considered as paid on 105 shares. Mortgages and charges: £30,000.

Mortgages and Charges

Gwent Radio Relay Service, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital (if any), dated September 17th, 1940, to secure all amounts now or at any time owing from the company to the chargees (Trade Distributors Ltd., Equitable House, South Parade, Nottingham).

Venner Time Switches, Ltd.—Debenture, charged on freehold premises at Merton and New Malden, Surrey, and the company's undertaking and other property, present and future, including uncalled capital, dated October 17th, 1940, to secure all moneys due or to become due from the company to Westminster Bank, Ltd.

Simpson Brothers (of Hapton), Ltd.—Satisfaction in full on September 30th, 1936, of debentures authorised November 25th, 1902, and registered December 6, 1902. (Notice filed November 9th, 1940.) (According to the register of mortgages, the debentures registered December 6th, 1902, originally secured £1,000.)

A. Saunders, Ltd.—Mortgage on moneys due under certain contracts, dated October 28th, 1940, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Liquidations

Westward Electrical Co. (1928) Ltd., 36, St. Helens Road, Swansea.—The statutory meeting of creditors was held recently at Swansea, when Mr. H. R. Bangham, a director, presided. The statement of affairs disclosed ranking liabilities of £1,206 and net assets of £1,147, leaving a deficiency, as regarded the creditors, of £59. It was decided that the voluntary liquidation of the company should be continued with Mr. L. S. Findlay, 35, Windsor Place, Cardiff, and Mr. G. M. Davies, 28, Rutland Street, Swansea, as joint liquidators, with a committee of inspection. Particulars of claims to the liquidators by December 31st.

S. H. Nicholds & Co., Ltd., electrical contractors, Birmingham.—The statutory meeting of creditors herein was held recently at Birmingham. The statement of affairs disclosed ranking liabilities of £3,651 and net assets of £1,522, leaving a deficiency, as regarded the creditors, of £2,129. The issued capital was £1,903, and so far as the shareholders were concerned there was a deficiency of £4,032. A resolution was passed confirming the voluntary liquidation of the company with Mr. H. C. Kelley, Birmingham, as liquidator, with a committee of inspection.

The Wycombe (Borough) Electric Light & Power Co., Ltd.—Winding up voluntarily. Liquidator, Mr. L. A. Pearl, 11, Waterloo Place, London, S.W.1.

Bankruptcies

R. Jackson, electrician, 5, Romney Avenue, Dalton-in-Furness, lately trading at 38, Whalley Range, Blackburn.—Receiving order made November 19th on the debtor's own petition.

(*Concluded on page* 121)

New Patents (*Concluded from page 117*).

oscillations." Philips Lamps, Ltd. May 19th, 1938. (528893.)

14649. "Television transmitters." Philips Lamps, Ltd. May 19th, 1938. (528894.)

14650. "Method of and apparatus for protecting electrical apparatus." Westinghouse Electric International Co. May 21st, 1938. (528895.)

14651. "Electric circuit-interrupters having arc-extinguishing arrangements." Westinghouse Electric International Co. May 25th, 1938. (528896.)

14694. "Control gear for AC commutator motors." Vaughan Crane Co., Ltd., F. Wood and G. V. Sadler. May 17th, 1939. (528926.)

14732. "Electric circuit-breakers of the gas-blast type." British Thomson-Houston Co., Ltd. (Allgemeine Elektricitäts-Ges.). May 17th, 1939. (528934.)

14733. "Electrical systems for the automatic regulation of a variable quantity." British Thomson-Houston Co., Ltd. May 17th, 1938. (528935.)

14734. "High-tension electric isolating switches." British Thomson-Houston Co., Ltd. May 17th, 1938. (528936.)

14775. "Magnetic electric relays." D. R. Price and Metropolitan - Vickers Electrical Co., Ltd. May 17th, 1939. (528940.)

14782. "Electric lamp fittings with lamp-locking devices." Vickers Train Lighting Co., Ltd., and G. R. Mason. May 17th, 1939. (528943.)

14784. "Radio receiving apparatus." D. J. Crowley. June 20th, 1938. (528944.)

14853. "Control of electric induction motors." Igranic Electric Co., Ltd. May 19th, 1938. (528958.)

16145. "Resilient supports for mounting electronic valves or tubes in electrical apparatus." Fabbrica Italiana Magneti Marelli. June 3rd, 1938. (528838.)

22452. "Means for automatically regulating the load in electric circuits." J. Almond. August 2nd, 1939. (528841.)

25934. "Portable traffic control apparatus." D. P. Williams. September 15th, 1939. (528842.)

1940

4081. "Electric fuel pumps." Stewart-Warner Corporation, and J. B. Whitted. March 7th, 1939. (Divided out of 527552.) (528843.)

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange markets entered the final month of the calendar year with firmness and consistent strength in all the gilt-edged departments. If it cannot be said that business shows noticeable signs of improvement, the statement may nevertheless be ventured that the investment demand, stimulated by the release of substantial sums of money, is having a favourable effect. The Home Railway position, while anything but clear, is lightened by the near approach of the dividend season. Investment demands industrial securities, preferably those of the better class.

Restriction upon dealing has been relaxed by the Treasury in about 140 issues of Canadian and other overseas stocks where the market is mainly in London. In very few of these stocks is there any such public interest as would lead to genuine activity. Great Northern Telegraphs, quoted in our lists, are now freed from the ban which previously forbade dealings in them between residents in this country, but the restriction continues to apply to most of the others that come under the prohibiton.

Rise in Indices

Mention was made here last week of the high level at which the index figure for gilt-edged stocks now stands. Further advance has occurred during the past few business days, and this has raised the index to nearly 112—a high point when compared with that of a year ago. Central Electricity Board issues have joined in the rise, the four stocks quoted in our overleaf lists showing gains that range from 10s. to 30s. Meanwhile, the index figure for industrials has sympathetically improved to 87, and the movement now in force, which diminishes the divergence between the two indices, may be expected to accelerate. Rumour is revived that a new Government loan may be offered in the fairly near future. The prophets talk of a possible short-dated stock that will supplement the present forms of Government borrowing.

Home Railways

The Railway Unions, as previously mentioned, have notified the companies of their intention to apply for an increase of pay for railwaymen. The demand was made last month; but, upon consideration, the Unions decided to postpone pressing it until a later date. The immediate effect upon prices in the Home Railway market was to introduce a note of uncertainty, and to cause a reaction from the best prices recently reached. On the postponement of the claims, however, the stocks recovered and are again the subject of a good deal of attention from the speculative investor. The prior-charge stocks are firm.

The agreement made between the Government and the railways last February in regard to the guarantee given by the former, is shortly to be reviewed. The position is complicated by uncertainties that surround the Government's forthcoming scheme for insurance against damage from war action, but optimism looks for the existing position to be in no way worsened from the point of view of proprietors of railway stocks. On this account, the prices of the various issues continue very steady London Passenger Transport "C" stock has improved to 31, the Board's announcement that the Green Line services were to be doubled, as from December 1st, being considered likely to result in a useful addition to the revenue, taken, of course, in conjunction with the rise in fares.

Electrical Investments

It is not to be supposed, of course, that the two indices are likely to approach closely to one another, in view of the tight Government control exercised over the money market, and consequently, upon the values of gilt-edged stocks. The average investor, however, having taken up as much as he can of the various war issues, is faced with the necessity of obtaining on other capital a higher yield than the Government stocks offer. He has been looking round for some time, and still continues to do so, for stocks and shares that give a better return. For this reason the ordinary shares, particularly those of first-class industrial companies, are very much in the limelight. Amongst such front-rank investments, shares in the electricity supply market, and in the group of companies connected with manufacturing and equipment branches, attract special attention.

Electricity supply shares have continued their advance, but there are not quite so many rises this time as there were a week ago. Improvements have occurred in the ordinary shares of the Bournemouth and Poole, Midland Counties, British Light and Power and Scottish Power Companies. Several of the preference shares are better, Northmet Power 6 per cent., for instance, being harder at 26s. 6d. and North Eastern 7 per cent. preference at 28s. 3d., the latter now showing a yield rather under 5 per cent. on the money. Cawnpore Electrics, in the Indian group, have strengthened to 26s. 3d.: the interim dividend is maintained at 3 per cent.

Murex, with a rise to £4, are 2s. 6d. up; Callenders have advanced to 61s. 3d. The rest of the shares in the manufacturing and equipment market have held the gains secured last week. The International Rubber Regulation Committee has raised the quota of rubber production to 100 per cent., with the result that rubber shares are a rather better market than before.

Preference Shares on Offer

Preference shares, the dividend service on which is covered by a good margin of earnings, are the subject of to-day's constant inquiry, and it may be of service to set out a short list of those on offer in the market. The following shares were available at the end of last week :—

Amount.	*Preference.*	*Divd.*	*Price.*	*Yield.* £ s. d.
500	Brit. Power & Light	6	26/–	4 12 5
650	City of London ..	8	31/3	5 3 0
1,000	London Assoc. ..	4½	18/6	4 19 0
500	North Eastern ..	5	21/3	4 14 0
350	North Met. ..	4	19/–	4 4 3
2,000	South Met. ..	4	18/3	4 7 8
550	West Kent ..	4½	19/–	4 15 0

Also 500 B.T.H. 7 per cent. preference can be obtained at 29s. 6d., to pay 4¾ per cent. on the money, and 2,500 English Electric 6½ per cent. "A" preference at 26s. 3d., yielding at that price £4 19s. per cent.

Tube Investments

The chairman at the meeting of Tube Investments, Ltd., held on Thursday of this week, had a very satisfactory report and figures to present. The dividend for the year ended October 31st last is repeated at 23½ per cent. Net revenue showed a decrease of about £44,000, but this could be regarded as practically neglible in view of the strength of the balance sheet and the progress that the company's subsidiaries are making. The ordinary share capital is £3,255,790, and in the balance sheet it is stated that £2,787,500 had been deposited with the Government free of interest in advance of the group's taxation-payments. The carry-forward of £157,000 is about £6,000 upon the year. Reserve for taxation at £4,290,000 is £1,800,000 more than that of a year ago.

The present price of the shares, 86s. 3d., is 27s. 3d. higher than the lowest reached during the present twelvemonth, but is still well below the peak of 96s. 9d. touched in the early part of this year. At the present price, the yield on the money comes to a little over 5½ per cent. In view of the figures just quoted, this is a reasonable return.

Ordinary Shares and Debenture Stock

To the old-fashioned mind, there is everything to be said against re-investing money that is realised by sale or redemption of debenture stock, in ordinary shares whose dividends are liable to fluctuation. The character of the two securities is of a wholly different nature. Force of circumstance, however, nowadays is regarded as sufficient excuse for substitution of ordinary shares in exchange for security of a higher order. To take one example, the holder of London Power 5 per cent. debenture stock who happens to have his stock drawn for repayment next month, may be ready to give favourable consideration to such companies as those in the electricity supply group whose financial position and past history give their ordinary shares a just title to be considered front-rank investments in their class. That this is the case, most Stock Exchange brokers are well aware, because they find their clients are not only willing, but are anxious to take an interest in ordinary shares such as, for instance, Lancashire Light & Power, Yorkshire Electric and others of similar description. The consequence is that the market in this group is practically denuded of the modest amount of stock which was in supply. The would-be buyer constantly finds that, in response to his order, he is informed there are no shares on offer.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 High-est	1940 Low-est	Dividend Pre-vious	Dividend Last	Middle Price Dec. 2	Rise or Fall	Yield £ s. d. p.c.
Home Electricity Companies							
Bournemouth and Poole	63/6	36/6	15	15	43/9	+¼	—
British Power and Light	30/–	20/–	7	7	25/6	+6d.	5 10 0
City of London	28/–	20/–	7½	7½	21/3	..	—
Clyde Valley	38/6	24/–	8	8	33/9	..	4 14 10
County of London	43/3	21/–	10½	10½	30/9	..	6 16 7
Edmundson's:							
7% Pref.	32/–	24/3	7	7	28/3	..	4 19 1
Ord.	27/6	18/6	9	6	24/–	..	5 0 0
Elec. Dis. Yorkshire	40/3	32/–	9	9	32/6	..	5 10 9
Elec. Fin. and Securities	42/–	34/6	12½	12½	38/9	..	6 15 0
Elec. Supply Corporation	48/–	39/–	12	11½	37/–	..	6 4 4
Isle of Thanet	16/–	5/6	4	4	6/–	..	—
Lancs Light and Power	33/–	21/6	7½	7½	27/6	..	5 9 1
Llanelly Elec.	21/–	17/–	5½	5½	18/–	..	6 2 5
Lond. Assoc. Electric	21/–	12/6	7	5½	13/9	..	—
London Electric	35/–	19/–	8	7	20/–	..	7 0 0
London Power Deb. Red.	105½	100	5	5	100½	..	4 19 6
Metropolitan	41/6	22/6	12	10	30/9	..	6 10 0
Midland Counties	39/–	23/3	8	8	32/6	+¼	4 18 6
Mid. Elec. Power	40/–	29/6	9	9	33/9	..	5 6 8
Newcastle Elec.	29/9	22/6	7	7	22/6	..	6 7 3
North Eastern Elec.:							
Ordinary	31/6	16/6	7	7	23/9	..	5 18 0
7% Pref.	32/6	25/6	7	7	28/3	+9d.	4 19 1
Northampton	44/–	38/–	10	10	38/9	..	5 3 3
Notting Hill 6% Pref. (£10)	10½	9	6	6	9	..	—
Northmet Power:							
Ordinary	42/3	22/6	10	10	30/9	..	—
6% Pref.	29/–	23/–	6	6	26/6	+6d.	4 10 7
Richmond Elec.	24/6	18/–	7	6	18/9	..	—
Scottish Power	38/–	24/–	8	8	32/6	+6d.	4 18 6
Southern Areas	21/3	12/9	5	5	14/6	..	6 18 0
South London	23/3	20/–	7	7	20/–	..	7 0 0
West Devon	20/–	17/6	5	5	20/–	..	5 0 0
West Glos.	22/–	15/–	2½	4½	16/3	..	5 10 10
Yorkshire Elec.	40/–	23/6	8	8	32/6	..	4 18 6
Overseas Electricity Companies							
Atlas Elec.	4/–	1/3	Nil	Nil	1/9	..	—
Calcutta Elec.	37/–	22/6	10*	8*	30/6	..	5 5 0
Cawnpore Elec.	30/–	24/–	10	10	26/3	+¼	7 12 4
East African Power	25/6	19/6	7	7	20/9	..	6 15 0
Jerusalem Elec.	24/–	15/–	7	7	17/6	..	8 0 0
Kalgoorlie (10/–)	12/6	9/6	7½	7½	11/6	..	6 10 5
Madras	26/9	21/6	8*	6*	25/–	..	—
Montreal Power	35½	30	1½	1½	32	..	—
Palestine Elec. "A"	25/–	10/–	5*	Nil	11/3	..	—
Perak Hydro-electric	20/3	13/–	2½	6	15/–	..	8 0 0
Shawinigan Power	27½	19	83cts.	90cts.	20	..	—
Tokyo Elec. 6%	69	52	6	6	30	..	20 0 0
Victoria Falls Power	75/9	56/6	15	15	68/9	..	4 7 3
Whitehall Investments Pref.	17/9	8/–	7½	7½	10/–	..	15 0 0
Public Boards							
Central Electricity:							
1950–70	110½	104	5	5	108½	+1½	4 12 2
1955–75	112½	106	5	5	109½	+½	4 11 4
1951–73	107½	102	4½	4½	105½	+½	4 5 3
1963–93	96½	90	3½	3½	92½	+½	3 15 8
London Elec. Trans. Ltd.	92	87½	2½	2½	93	..	2 15 9
London & Home Counties 1955–75	113½	105	4½	4½	105½	..	4 5 4
Lond. Passenger Transport:							
A	116	104	4½	4½	107	..	4 4 0
B	116	102½	5	5	104½	..	4 15 8
C	65½	25	1½	1½	31	+2	4 16 9
West Midlands Joint Elec. 1948–68	106½	103	5	5	105½	..	4 14 9
Telegraph and Telephone							
American Tel. & Tel.	230	176	9	9	200	..	4 10 0
Anglo.-Am. Tel.:							
Pref.	107	85	6	6	96	..	6 5 0
Def.	23⅞	18	1½	1½	22½	..	6 13 4
Anglo-Portuguese	22/6	10/–	8	8	15/–	..	10 13 4
Cable & Wireless:							
5½% Pref.	99⅞	66	4½	5½	92	..	5 19 7
Ord.	65	27	4	4	55½	..	7 4 4
Income	99⅞	93	..	..	99	..	4 0 10
Canadian Marconi $1	6/–	4/–	Nil	4cts.	4/6	..	—
Globe Tel. & Tel.:							
Ord.	32/6	21/6	7½*	6*	25/–	..	4 16 0
Pref.	27/9	22/6	6	6	23/9	..	5 1 1
Great Northern Tel. (£10)	20	11	20	20	12½	..	—
Inter. Tel. & Tel.	5½	2½	Nil	Nil	3½	..	—
Marconi-Marine	30/–	18/3	10	7½	20/–	..	7 10 0
Oriental Telephone Ord.	2⅞	45/–	12*	11½*	2	−¼	4 19 7
Telephone Props.	15/–	11/–	5	6	11/3	..	10 13 4
Telephone Rentals (5/–)	9/6	5/3	10	10	6/6	..	7 15 10

Company	1940 High-est	1940 Low-est	Dividend Pre-vious	Dividend Last	Middle Price Dec. 2	Rise or Fall	Yield £ s. d. p.c.
Traction and Transport							
Anglo. Arg. Trams:							
First Pref. (£5)	4/3	1/–	Nil	Nil	2/–	..	—
4% Inc.	11½	2	Nil	Nil	9	..	—
British Electric Traction:							
Def. Ord.	830	400	5	45	750	..	6 4 4
Pref. Ord.	169	130	8	8	140	..	5 14 3
Bristol Trams	48/6	32/6	10	8*	37/6	..	—
Brazil Traction	12⅞	5½	$1	50c.	5½	..	—
Calcutta Trams	24/–	16/3	8	5½	19/–	..	5 15 9
Cape Elec. Trams	18/6	16/–	5	5	17/–	..	5 17 8
Lancs Transport	35/–	27/6	10	10	35/–	..	5 14 3
Mexican Light:							
1st Bonds	36	25	5	5	30	−5	—
Rio 5% Bonds	95	74	5	5	85	..	5 17 8
Southern Rly.:							
5% Prefd.	79	35	5	5	45½	..	10 9 10
5% Pref.	104½	59	5	5	82½	..	6 1 3
T. Tilling	45/9	29/–	10	10	39/6	−6d.	5 1 3
Tilling & B.A.	47/6	41/9	9*	8*	44/6	..	—
West Riding	35/–	25/–	10	10	34/–	..	5 17 8
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	10/–	15	Nil	14/–	..	—
Assoc. Elec.:							
Ord.	43/3	26/6	10	10	40/–	..	5 0 0
Pref.	36/6	32/3	8	8	35/–	..	4 11 5
Automatic Telephone & El.	47/3	32/–	12½	12½	37/6	..	6 13 4
Babcock & Wilcox	50/–	28/6	10	11	39/6	+9d.	5 11 2
British Aluminium Ord.	56/–	29/–	12½	12½	42/–	−6d.	—
British Insulated Ord.	92/6	67/–	20	20	81/3	+½	4 18 6
British Thermostat (5/–)	14/9	6/6	18½	18½	11/3	..	8 4 6
British Vacuum Cleaner (5/–)	12/–	4/9	40	12½	6/3	..	10 0 0
Brush Ord.	4/6	1/9	Nil	Nil	3/9	..	—
Callender's	69/–	46/–	15	15	61/3	+¼	4 18 0
Chloride Elec. Storage	72/6	55/–	15	15	60/–	..	5 0 0
Consolidated Signal	72/6	59/–	36½	17	60/–	..	5 13 4
Crabtree (10/–)	24/9	17/6	17½	17½	22/6	..	7 15 7
Crompton Parkinson:							
Ord. (5/–)	20/–	12/–	30	20	17/6	..	5 14 3
E. K. Cole (5/–)	5/–	2/6	10	Nil	4/6	..	—
Elec. & Musical Industries (10/–)	10/3	4/3	5	Nil	7/6	−3d.	—
Electric Construction	36/3	27/6	13½	10	27/6	..	7 5 6
Enfield Cable Ord.	56/–	40/6	25	16¼	45/–	..	7 5 5
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	..	5 0 0
English Electric	33/9	16/6	10	10	28/9	..	6 19 2
Ensign Lamps (5/–)	15/3	12/6	25	25	15/–	..	8 6 8
Ericsson Tel. (5/–)	39/3	23/–	25*	25*	27/6	..	—
Ever Ready	28/3	16/6	30	40	25/6	..	7 16 10
Falk Stadelmann	18/3	12/6	6	7	13/9	..	10 3 8
Ferranti Pref.	25/–	22/–	7	7	23/9	..	5 18 0
G.E.C.:							
Pref.	32/6	26/–	6½	6½	30/–	..	4 6 8
Ord.	83/3	53/–	20	20	77/–	..	5 4 0
Greenwood & Batley	25/6	20/–	15	15	20/–	..	13 0 0
Hall Telephone (10/–)	18/6	8/9	15	10	11/3	..	8 18 0
Henley's (5/–)	21/6	12/6	20	20	18/9	..	5 6 8
4½% Pref.	21/2	20/6	4½	4½	21/3	..	4 4 8
Hopkinsons	46/9	32/6	12½	15	38/9	..	7 14 10
India-Rubber Pref.	21/–	19/6	5½	5½	20/–	..	5 10 0
Intl. Combustion	121/3	70/–	32½	32½	4½	..	7 17 9
J. Lucas	60/6	40/–	15	15	48/9	..	6 3 4
Johnson & Phillips	50/9	32/6	12½	15	45/–	..	6 13 4
Lancashire Dynamo	59/9	47/6	25	20	47/6	..	8 8 5
Laurence Scott (5/–)	11/–	6/–	15	15	7/–	..	10 14 2
London Elec. Wire	25/6	20/–	7½	7½	22/6	..	6 13 4
Mather & Platt	46/6	30/–	13½	10	35/–	..	5 14 3
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	..	5 3 6
Murex	86/9	52/6	20	20	4	+½	5 0 0
Pye Deferred (5/–)	9/–	6/9	25	25	8/9	..	14 5 8
Revo (10/–)	20/9	11/6	17½	5	17/6	..	2 17 6
Reyrolle	60/6	41/–	12½	12½	46/3	..	5 8 2
Siemens Ord.	23/9	15/6	7½	7½	17/6	..	8 11 6
Strand Elec. (5/–)	2/3	9d.	10	4	1/3	..	16 0 0
S. Smith (1/–)	8/–	3/6	37½	50	7/6	..	6 13 4
Switchgear & Cowans (5/–)	11/9	5/6	20	10	7/6	..	6 13 4
Telegraph Condenser (10/–)	8/9	6/3	5	..	7/6	..	—
Telegraph Construction	42/6	29/–	10	10	33/9	..	5 18 6
Telephone Mfg. (5/–)	9/–	5/–	9	9	6/–	..	7 10 0
Tube Investments	96/9	59/–	23⅞	23⅞	86/3	+¼	5 11 0
Vactric (5/–)	3/6	2/–	4	Nil	2/3	..	—
Vickers (10/–)	22/–	9/6	10	10	14/6	..	6 18 0
Ward & Goldstone (5/–)	19/9	12/6	20	20	12/6	..	8 0 0
Westinghouse Brake	46/–	30/6	17½	10	33/9	..	5 18 6
Walsall Conduits (4/–)	26/6	17/6	55	55	23/9	..	9 5 0
West, Allen (5/–)	7/–	3/–	7½	10	3/9	..	10 0 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Aldershot.—Emergency pumping plant at sewage works; borough engineer, Council offices, Grosvenor Road, Aldershot.

New Zealand. — WELLINGTON. — Public Works Department. January 14th. Two 3,000-kVA, 11-kV, three-phase, 50-cycle outdoor-type voltage regulating transformers and control equipment. (T.22238/40.)*

December 10th. One 2,250-kVA, 11 kV transformer for the Kiri substation, and two for Winton substation. (T.22551/40.)*

South Africa.—PRETORIA.—Union Tender & Supplies Board. December 12th. Electric light fittings for G.P.O. (T.22426/40.)*

January 4th. Plant at Gasworks, Cottesloe: (a) One 200-kW rotary convertor and associated equipment. Alternatively (b) one 200-kW mercury arc rectifier or (c) two 100-kW mercury arc rectifiers. (d) Equipment for spare power circuit frame. (T. 22424/40.)*

Dublin.—December 17th. Grangegorman Mental Hospital Joint Committee. Centralised steam plant, including heating, hot water, electrical, and sundry services. Plan and specification from V. Kelly, architect, 87, Merrion Square South, and quantities from F. C. Ward, 133, Griffith Avenue. (Deposit: £10 10s.) Tenders to J. J. Doyle, chief clerk, Grangegorman Mental Hospital.

Morley.—December 9th. Corporation. Change-over at four premises from single-phase equipment to three-phase system. electrical engineer, Electricity Offices.

Orders Placed

Cannock.—Urban District Council. Provisionally accepted. Switchgear in connection with change-over of bulk supply.—Ferguson, Pailin, Ltd.; General Electric Co., Ltd.

Colchester.—Town Council. Provisionally accepted. Supply and erection of an 11,000-V switchboard.—General Electric Co., Ltd.

Darlington.—Town Council. Accepted. Switchgear for control of feeder cable (£339). —A. Reyrolle & Co., Ltd.

Hayes and Harlington.—Urban Council. Accepted. Electric lighting of public shelters.—A. W. Seth, Hayes.

Northumberland.—County Council. Accepted. Electric lighting of public shelters in the Berwick area (£295).—A. R. Hudson, Morpeth.

Surrey.—Laundries Committee. Accepted. Lighting installation at the central laundry (£3,433).—Buchanan & Curwen.

Glasgow.—Corporation Streets Committee. Accepted. Installation of additional lanterns, etc., on automatic traffic signals (£138). —Automatic Telephone & Electric Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abersychan.—Kitchen at Technical Institute, Talywain; secretary to Governors.

Adlington. — Houses for Macclesfield R.D.C.; J. H. Walters, architect, 19, Moody Street, Congleton, Cheshire.

Bangor (N. Wales).—Conversion to flats, Bodment, Menai Avenue; E. F. J. Morgan.

Barton.—Laboratory and works extensions, Manchester Oil Refinery Co., Ltd.

Bedford.—Town hall; Harvey & Wicks, architects, Birmingham.

Additions Silver Jubilee school (£2,400); borough engineer.

Belfast.—Works at Hospital for Children, Greenisland (£2,000); city surveyor, City Hall, Donegall Square, Belfast.

Birmingham.—Reconstruction of Market Hall as open market; H. J. Manzoni, city engineer, Council House, Birmingham 1.

Boston.—Pumping machinery and improvements to waterworks; W. R. Beardall, waterworks engineer, Rural Council Offices, Boston.

Conversion of casual ward into maternity hospital for Holland C.C. Health Committee; W. M. Smith, county architect, County Hall, Boston.

Brechin.—Houses (22) for T.C.; W. W. Young, borough surveyor, 30, Panmure Street.

Bredbury.—Completion of Harrytown School for Cheshire E.C.; F. A. Browne, county architect, The Castle, Chester.

Bursiem.—Alterations, Scotia Road; W. Tilstone & Sons, Ltd.

Additions, Clyde Colour Works, Nile Street; J. Davies, Ltd.

Bury.—New pumping plant, Bury Works; Lancs Rivers Board, Preston.

Caernarvon. — Public shelters for 625 persons on nine sites and communal shelters for borough (£22,000); borough surveyor, Town Hall.

Carlisle. — Service canteen extensions, Railway Station, for Citizens' League;

Financial Section (*Concluded from page 118*)

C. F. A. Henckel (Dawson & Henckel), electrical dealer, 42, Grays Inn Road, London, W.C.1.—Trustee, Mr. A. Cripwell, 119, Finsbury Pavement, E.C.2, appointed November 15th.

Reports and Dividends

Crompton Parkinson, Ltd., report a profit for the year ended September 30th of £400,514, as compared with £404,903 in the preceding year. It is proposed to pay a final dividend on the ordinary and "A" ordinary stock of 7½ per cent. actual, making 15 per cent., less tax, for the year, and in addition a special cash bonus of 5 per cent, making 20 per cent. for the year (same). It is also proposed to pay a sum of £5,000 to the trustees of the Central Benevolent Fund. The balance carried forward is £187,360 (against £81,392 brought in).

The British Electric Transformer Co., Ltd., reports a profit for the year ended September 30th of £52,532, as compared with £79,736 for 1938–39. The final ordinary dividend is 1s. per share actual, free of tax, making 2s. per share (against 3s. 6d.), free of tax, for the year. The balance carried forward is £5,107 (against £2,105 brought in).

Tube Investments, Ltd., which holds a controlling interest in the Mersey Cable Works, Ltd., the Simplex Electric Co. Ltd., and other companies, reports a net revenue for the year to October 31st of £820,930, a decrease of £43,935, as compared with 1938-39. Reserve fund receives £150,000, and reserve against investments £100,000. As already announced, the dividend on the ordinary stock for the year is being maintained at 23¾ per cent. The balance carried forward is £157,236 (against £151,332 brought in).

Ensign Lamps, Ltd., reports a trading profit for the year ended June 30th of £35,596, as compared with £33,975 in the preceding year, to which is added bank interest and transfer fees, making a total of £35,663. After deducting directors' fees and tax provision, the net profit is £7,435 (against £16,798). The final dividend is 15 per cent. making 25 per cent. less tax for the year (unchanged) and £7,086 is carried forward (against £10,994 brought in).

Ultra Electric, Ltd.—The report to April 30th received by Ultra Electric (Holdings) from the manufacturing company shows a net profit of £1,558, as compared with a loss of £53,028 for 1938-39. This has been deducted from the debit brought in (£85,428). The manufacturing company has paid to the Holdings Company £1,050 in respect of services rendered. The latter's accounts to June 30th show a balance of £25 after deducting administration expenses, £75, and directors' fees, £950. This balance is applied to reducing the debit on the profit and loss account to £655.

The Para Electric Railways & Lighting Co. states that owing to the difficulty of obtaining remittances from Brazil, on account of exchange control, it will not be possible to pay the interest due on the 5½ per cent. prior lien debenture stock and the 6 per cent. first debenture stock due on December 1st.

British Industrial Plastics, Ltd., reports trading profits of £163,069 for the year to September 30th, against £101,631 in 1939-40. The net earnings, after providing for taxation amounted to £24,398 (£22,404). The ordinary dividend is maintained at 8 per cent. and £5,681 (against £3,917) is carried forward.

Broom & Wade, Ltd., report a net profit of £87,813 (against £83,107). The final dividend of 15 per cent. maintains a total distribution at 22½ per cent. for the year.

Hick, Hargreaves & Co., Ltd., propose to pay an interim dividend of 2 per cent., as last year.

Edmundson's Electricity Corporation, Ltd., is maintaining its interim ordinary dividend at 2½ per cent. less tax.

W. & T. Avery, Ltd., are maintaining their interim dividend at 5 per cent.

The Electrolux Corporation is paying a quarterly dividend of 25 cents on the common shares (same).

The Telephone Manufacturing Co., Ltd., is again paying an interim dividend of 2½ per cent.

A. Creighton, hon. treasurer, 17, Norfolk Road.

Cleckheaton.—Houses at Windybanks site for Spenborough U.D.C.; Surveyor's Office, Town Hall, Cleckheaton.

Clitheroe. — Decontamination laundry; borough surveyor, Church Street, Clitheroe.

Office premises; J. Bleazard & Sons, contractors, Railway View, Clitheroe.

Cumberland.—Improvements to Blennerhasset School; J. H. Haughan, architect, 4, Alfred Street North, Carlisle.

Dundee. — Raid shelters improvement scheme (£100,000); city engineer.

Durham.—Shelter at Newhouse R.C. School (£474); J. E. Morgan, builder, Chester-le-Street.

Additions to Durham Girls' County School (£5,930); F. Willey, county architect, 34 Old Elvet, Durham.

Shelters at a further 23 schools; County architect.

East Riding.—Works at Driffield Base Hospital (£5,000); county architect, County Hall, Beverley.

Finchley.—27 shelters in four blocks, Red Lion Hill Estate; borough engineer, Municipal Offices, Finchley, N.3.

Halesowen.—Erection of brickworks, Old Hawne Colliery, Haysuch Lane; Garratt & Co. Ltd., colliery owners, Corngreaves, Cradley Heath.

Hampshire.—Shelters (£31,000); County architect.

Additions Tatchbury Mount Colony (£5,000); County architect.

Hindley. — 80 communal shelters for U.D.C.; builders, W. J. Bickerstaffe & Son, Wigan; J. W. Liptrot, Pemberton, Wigan; Heaton & Dennis, Orrell, Wigan; J. W. Whiteside, Hindley, Wigan.

Huyton-with-Roby.—Cleansing station, for U.D.C.; surveyor, Surveyor's Office, Tarbock Road, Huyton.

Jarrow. — Completion of thirty-eight houses for the T.C.; J. S. Weir, borough engineer.

Lanarkshire. — Underground air-raid shelters for County Council (£1,800,000); Architect, County Council, Hamilton.

Lisburn.—Storage accommodation buildings at Council yard, and A.R.P. cleansing centre at District Hospital; T. J. McDonald, town clerk, Town Hall, Lisburn.

Manchester.—Works extensions, Trafford Park Road, Trafford Park; Thomas Hedley & Sons, Ltd., soap manufacturers, Newcastle-on-Tyne.

Works extensions; London Electric Wire Co. and Smith's Ltd., 4, Chatham Street, Manchester, 2.

Works canteen; Superheater, Ltd., Mosley Road, Trafford Park.

Mansfield.—Ward block & out-patients' department at General Hospital; H. James (Mansfield), Ltd., builders, Station Street, Mansfield.

March.—Additions police quarters; Isle of Ely county architect.

Market Bosworth. — Laundry improvements, Institution (£2,000); Leicestershire C.C.

Market Drayton.—Houses (100), Dalelands Estate, for U.D.C.; surveyor, Town Hall, Market Drayton.

Market Harborough.—Completion of new maternity hospital, for Management Committee; Pick, Everard, Keay and Gimson, architects, Leicester.

Maryport.—Fifty-six houses, Short Acres, for the North-Eastern Housing Association; L. J. Couves and Partners, architects, 2, Westfield Avenue, Gosforth, Northumberland.

Monaghan.—New technical school, for County Monaghan Vocational E.C.; W. H. Byrne & Son, architects, 20, Suffolk Street, Dublin.

Morecambe.—Decontamination laundry at White Lund for Lancs C.C.; S. Wilkinson, county architect, County Offices, Preston.

Newcastle-on-Tyne. — Substation for Northern Rediffusion Services, Ltd.; Newcombe & Newcombe, architects, 23, Eldon Square.

Factory extensions, for Metal Box Co., Ltd., Heaton Junction; staff architect.

Oil store, Skinnerburn Road, for Rimer Bros., Milburn House, staff architect.

North Riding.—Air-raid shelters for 22,000 children (£78,000); J. W. White, county architect, County Hall, Northallerton.

Reconstruction work at Grangetown School, Eston, for E.C.; R. Sawtell, county surveyor, County Hall, Northallerton.

Portland.—Waterworks (£43,475); U.D.C. Surveyor.

Redditch. — Houses (176), Greenlands Estate, for U.D.C.; surveyor, Council House, Redditch.

Richmond (Surrey). — Communal dormitory shelters to provide sleeping accommodation for 528 persons, for seven areas; borough engineer's office, Hotham House, Heron Court, Richmond.

Richmond (Yorks).—23 air-raid shelters, each to accommodate 50 people; H. D. Stanworth, borough engineer, Town Hall, Richmond.

Romford.—Shelters (50 persons each), at various sites; borough surveyor, 8, Hall Road, Romford.

Rushden.—Recreation hall at Sanatorium for Northants C.C.; G. H. Lewin, county architect, County Hall, Northampton.

Stirling.—One-storey building, 18, Abbey Road; McNeill Tractors, Ltd.

Upper storey to building, Cornton Road; Rubber Company of Scotland, Ltd., Forthvale Works.

Stirlingshire.—18 houses at Lennoxtown for County Council; T. M. Copland & Blakey, architects, 76, High Street, Falkirk.

Stockport.—Hospital block at Shaw Heath P.A.C. Institution; Health Committee, Stockport Corporation, Town Hall.

Nurses' home at Stepping Hill Hospital for T.C.; H. S. Fairhurst & Son, architects, 55, Brown Street, Manchester.

Stoke-on-Trent. — Stores alterations, Church Street; Boots Pure Drug Co., Ltd.

Sunderland.—Church, rectory and school, Springwell Farm Estate; R.C. authorities.

Surrey.—50 canteens; county architect.

Teesdale (Co. Durham).—Shelters at schools in Teesdale area for Durham Education Committee; F. Willey, architect, 34, Old Elvet, Durham City.

Tonbridge.—Fire station, Matfield (£1,250), for R.D.C.; surveyor, Council Offices, 48, Pembury Road, Tonbridge, Kent.

Trafford Park.—Works extensions, and boiler house; F. Hill & Sons, Ltd., Joinery Works, Trafford Park Road.

Urmston. — Fire station and A.R.P. quarters, Trafford Park; Robert Carlyle & Co. Ltd., builders, Elsinore Road, Old Trafford, Manchester.

Wakefield. — Workshops at Technical College for E.C.; S. G. Wardley, city architect, Town Hall.

Warrington.—Conversion of The Grange, Thelwall, into convalescent home (£3,000); secretary, Infirmary Management Committee.

Alterations, Ritz Cinema, Barbould Street; Union Cinemas, Ltd.

West Riding.—Nine shelters and sanitary accommodation, Middleton-in-Wharfedale Sanatorium for C.C.; county architect, County Hall, Wakefield.

Purchase Tax and the Electrical Industry

Address by Mr. V. W. Dale

A USEFUL commentary upon the ways in which the Purchase Tax concerned the electrical industry was given by Mr. V. W. Dale, business manager of E.D.A., at a recent meeting of the Ipswich and District Electrical Association. In his opening remarks Mr. Dale reviewed the nature and purpose of the tax and said that the determination of the wholesale value upon which the tax was levied was the task of the Valuation Department of H.M. Customs and Excise. This Department carried out this task with the aid of organised sections of industry and the one which concerned electrical business was the Purchase Tax Electrical Industry Committee.

During the last few weeks the British Electrical Development Association had received hundreds of inquiries from its members. In the majority of cases it had been possible to give immediate answers but when necessary the questions had been referred to the Purchase Tax Committee. The speaker gave as an instance the case of boiling plates for replacement purposes. Some members had been credibly informed that these were chargeable; others that they were not. Through the Committee it was ascertained that boiling plates supplied as renewals and for maintenance were not chargeable, and hundreds of supply undertakings operating hire schemes breathed more freely.

Among specific points dealt with by Mr. Dale was the position of electricity supply authorities who from time to time made casual sales to trade customers. These were at present exempt from registration, but this did not apply to authorities with central purchasing departments who re-sold on wholesale terms to subsidiaries.

Since it was a fairly general practice in the electrical industry to base wholesale values on list prices less varying discounts, most of the associations had arrived at arrangements with the Valuation Department under which it had been agreed that "wholesale value" should be arrived at by the deduction of certain percentages from list prices. For example, electric cookers were list price less 25 per cent. and the tax was thus levied on 75 per cent.; a third of this was 25 per cent. which represented the amount of tax. Similarly for lamps the percentage was 22 per cent. and the tax was imposed on 78 per cent. of the list price and amounted to 26 per cent. In the case of certain electrical articles, *e.g.*, valves and torch batteries the Commissioners had agreed specific amounts. Mr. Dale expressed the view that unless the Commissioners were prepared to allow the retailer to "gain on the roundabouts what he lost on the swings" it would seem almost impossible for him to avoid a loss in some cases as a result of the levying of the tax.

At the conclusion of a long discussion, Mr. Dale said that queries would have to continue to be remitted to H.M. Customs and Excise for some time to come and it was not to be expected that the tax would operate with complete smoothness immediately. He stressed the importance of referring all queries to the appropriate trade associations.